

SOFTWARE REQUIREMENTS SPECIFICATION
FOR THE
TACTICAL ENVIRONMENTAL SUPPORT SYSTEM/
NEXT CENTURY [TESS(3)/(NC)]
METEOROLOGICAL/OCEANOGRAPHIC (METOC) DATABASE

VERSION 1.0
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PRELIMINARY

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1 SCOPE

1.1 Identification

This document establishes the requirements for the Meteorological and Oceanographic (METOC) Database of the Tactical Environmental Support System/Next Century [TESS(3)/NC].

1.2 System Overview

This specification establishes the requirements for the METOC Database component of the Tactical Environmental Support System (TESS(3)/Next Century (NC)) Program (NITES Version I). On 29 October 1996, the Oceanographer of the Navy issued a TESS(3) Program Policy statement in letter 3140 Serial 961/6U570953, modifying the Program by calling for five seamless software versions which are Defense Information Infrastructure (DII) Common Operating Environment (COE) compliant, preferably, to level 5.

The five versions are:

- NITES Version I The local data fusion center and principal METOC analysis and forecast system. (TESS(3)/NC)
- NITES Version II The subsystem on the JMCIS or GCCS systems (NITES/JMS)
- NITES Version III The unclassified aviation forecast, briefing and display subsystem tailored to Naval METOC shore activities (currently satisfied by the Meteorological Integrated Data Display System (MIDDS))
- NITES Version IV The Portable subsystem composed of independent PCs/workstations and modules for forecaster, satellite, communications, and IC4ISR functions (currently the Interim Mobile Oceanographic Support System (IMOSS))
- NITES Version V Foreign Military Sales (currently satisfied by the Allied Environmental Support System (AESS))

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NITES I acquires and assimilates various METOC data for use by US Navy and Marine Corps weather forecasters and tactical planners. NITES I provides these users METOC data, products, and applications necessary to support the warfighter in tactical operations and decision making. NITES I provides the METOC data and products to NITES I and NITES II applications, as well as non-TESS(3)/NC systems requiring METOC data. It shall provide those data and products in a heterogeneous networked computing environment.

1.3 Document Overview

This document is divided into the following sections:

- | | |
|-----------|---|
| Section 1 | Identifies the CSCI and system to which this document applies, and provides an overview of the document. |
| Section 2 | Provides a list of referenced documentation. |
| Section 3 | Sets forth the requirements for the TESS(NC) METOC Database, including states and modes of operation, capability requirements, interface requirements, adaptation requirements, safety requirements, security and privacy requirements, CSCI environment requirements, computer hardware and software requirements, quality factors, and other applicable requirements. |
| Section 4 | Details the qualification provisions for the TESS(NC) METOC Database. |
| Section 5 | Provides requirements traceability. |
| Section 6 | Provides applicable notes, including a glossary of acronyms used in this document. |

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2 REFERENCED DOCUMENTS

2.1 Government Documents

2.1.1 Specifications and Standards, and Handbooks

- (1) MIL-PRF-xxx - Performance Specification (PS) for the Tactical Environmental Support System / Next Century TESS(3)/NC (A/N UMK-3) (NITES version I and II) Draft, 27 May 97, SPAWAR
- (2) OTH-GOLD - Operation Specification for Over-the-Horizon Targeting Gold Revision B Change 2, 1 August 1996
- (3) MIL-STD-498 - Software Development and Documentation
- (4) MIL-STD-961D - Department of Defense Standard Practice for Defense Specifications [22 March 1995]
- (5) MIL-STD-6040 - United States Message Text Formats (USMTF) Joint Pub 6-04
- (6) MIL-STD-2500 - National Imagery Transmission Format (NITF) for the National Imagery Transmission Format Standard (NITFS)
- (7) MIL-STD-2500A - National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard, 12 October 1994
- (8) MIL-STD-2301 - Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard, 18 June 1993

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- (9) MIL-STD-188-196 - Bi-Level Image Compression for the National Imagery Transmission Format Standard, 18 June 1993
- (10) MIL-STD-188-198A - Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard, 15 December 1993
- (11) MIL-HDBK-1300A - National Imagery Transmission Format Standard (NITFS), 12 October 1994

2.1.2 Other Government Documents, Drawings, and Publications

- (12) DII COE - Architectural Design Document for the Defense Information Infrastructure (DII) Common Operating Environment (COE), January 1996, DISA Center for Computer Systems Engineering
- (13) DII COE I&RTS - Defense Information Infrastructure (DII) Common Operating Environment (COE) Integration and Runtime Specifications (I&RTS), Version 3.0, January 1997
- (14) DII COE SRS - Defense Information Infrastructure (DII) Common Operating Environment (COE) System Requirements Specification, Draft, 1996, Institute for Defense Analysis
- (15) DII COE, Baseline Specification - Defense Information Infrastructure (DII) Common Operating Environment (COE) Version 3.0 Baseline Specifications, 31 October 1996, DISA
- (16) DII Compliance - DII Software Quality Compliance Plan Defense Information Infrastructure Software Quality Compliance Plan, Draft, 1 January 1996, DISA

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- (17) UIS for DII COE - User Interface Specification for Defense Information Infrastructure (DII), Version 2.0, 1 April 1996, DISA. This document, sometimes called the DII Style Guide
- (18) OR #369-096-94 - TESS Operational Requirement
- (19) IT21 - CINCPACFLT Pearl Harbor HI 300944Z MAR 97 (ALPACFLT 008/97), Subj: Information Technology for the 21st Century (IT 21)
- (20) Concept of Operations - Commander, Naval METOC Command, dtd 22 Oct 96
- (21) OPNAVINST 5239.1A - Department of the Navy Automated Data Processing Security Program
- (22) CNO TESS(3) Policy Letter - CNO (096) ltr 3140 Ser 961/6U570953 of 29 Oct 96
- (23) SECNAVINST 5239.3 - Department of the Navy Automated Information Systems (AIS) Security Program, 14 July 1995
- (24) Designation: ANSI X3.135-1992 - Information Systems - Database Language - SQL (includes ANSI X3.168-1989)
- (25) JMCIS COMMS - JMCIS COE, Communications Service Applications Programmer's Interface
- (26) DI-IPSC-81433 5 December 1994 - Data Item Description (DID) for the Software Requirements Specification (SRS), per MIL-STD-498
- (27) DoD 8320.1-M-1 19 November 1996 - Data Standardization Procedures (Draft)
- (28) COMNAVMETOC COMINST 3141.2 - Surface METAR Observations Users Manual

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- (29) COMNAVMETOC - Ship Weather Observations Manual
COMINST
3144.1D
- (30) AWSR 105-2 - Weather Communications Policies and Procedures
24 August 1990
- (31) Unnumbered - Tactical Environmental Data Subsystem (TEDS)
10 June 1997 Release 3.5 Model Data Applications Program
Interface (API) User's Guide
- (32) Unnumbered - Tactical Environmental Data Subsystem (TEDS)
20 June 1997 Release 3.5 Observation/Profile Data Applications
Program Interface (API) User's Guide
- (33) Unnumbered - Tactical Environmental Data Subsystem (TEDS)
20 June 1997 Release 3.5 Image Data Applications Program
Interface (API) User's Guide
- (34) Unnumbered - Tactical Environmental Data System (TEDS)
01 August 1997 Release 3.5 Remotely Sensed Data Applications
Program Interface (API) User's Guide
- (35) FMH-1 - Federal Meteorological Handbook No. 1: Surface
December 1995 Weather Observations and Reports
- (36) FMH-2 - Federal Meteorological Handbook No. 2: Surface
December 1988 Synoptic Codes
- (37) FMH-10 - Federal Meteorological Handbook No. 10:
December 1988 Meteorological Rocket Observations
- (38) FMH-11 - Federal Meteorological Handbook No. 11:
June 1991 Doppler Radar Meteorological Observations

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2.2 Non-Government Documents

- (38) WMO FM-92-VIII - The World Meteorological Organization Format
Ext. GRIB for the Storage of Weather Product Information
and the Exchange of Weather Product Messages in
Gridded Binary Form
- (39) WMO FM-94-IX - The WMO code for the Storage and Exchange of
Ext. BUFR Weather Product Information and Messages in
Binary Universal Form for the Representation of
Meteorological Data
- (40) WMO Publication - Manual on Codes Volume 1.1, Part A -
No. 306 Alphanumeric Codes. Volume 1.2, Part B -
Binary Codes. Part C - Common Features to
Binary and Alphanumeric Codes
- (41) OSF/Motif™ Style - OSF/Motif™ Style Guide, Revision 1.2, Open
Guide Software Foundation, PTR Prentice-Hall, Inc.,
Englewood Cliffs, New Jersey 07632, 1993
- (42) WMO-386 - Manual on the Global Telecommunications
1992 System

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3 REQUIREMENTS

3.1 Required states and modes

The METOC Database shall have two modes of operation: Online and Maintenance. Modes shall be available only following successful installation of the METOC Database segments. Implementation of the METOC Database modes is dependent on the DII COE COTS DBMS selected to support the METOC database.

3.1.1 On-line Mode

The METOC database shall be considered in on-line mode when users or user applications can establish a connection with database and perform all database operations granted to the user or user application.

3.1.2 Maintenance Mode

The METOC database shall be considered in maintenance mode when on-line mode operations are suspended and privileged system administration operations (i.e., DBA) only are permitted.

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3.2 METOC Database Capability Requirements

This section describes the required capabilities of the TESS(3)/NC METOC Database.

3.2.1 Common METOC Database Requirements

The following requirements are intended to be applied across all segments comprising the METOC Database.

- 3.2.1.1 The METOC Database shall provide DII COE compliant database segments that will serve as the repository of METOC data and products.
- 3.2.1.2 All METOC Database segments shall be developed in accordance with the DII COE Integration and Runtime Specification (I&RTS) identified in Section 2 of this document. In particular, recommendations and requirements identified in Sections 4 and 5 of the I&RTS shall be incorporated.
- 3.2.1.3 The METOC Database shall be at least DII COE Level 5 compliant as defined in Appendix B of the DII COE I&RTS referenced in Section 2 of this document.
- 3.2.1.4 The METOC Database shall adhere to the DoD data modeling standards identified in the DoD Joint Technical Architecture (JTA) documentation referenced in Section 2 of this document. Specifically, the METOC Database shall comply with the DoD Data Model (DDM) and rely on the DDM as the logical basis for the METOC Database design.
- 3.2.1.5 The physical database schema used in the METOC Database shall be traceable to the DDM.
- 3.2.1.6 METOC Database data elements and names shall comply with DoD standards from the DDM and the Defense Data Dictionary System (DDDS). Each data element chosen from the DDM shall use the data type and unit of measure prescribed in the standard.

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- 3.2.1.7 Data element requirements not currently contained within the DDM shall be submitted for approval by the DDM functional data stewards in accordance with DoD Manual 8320.1-M-1, Data Standardization Procedures.
- 3.2.1.8 The METOC Database shall use a DII COE approved Database Management System (DBMS) to provide data management services (i.e., definition, storage, retrieval, and maintenance) and serve as the repository of METOC data and products.
- 3.2.1.9 The METOC Database shall support data access in a heterogeneous networked computing environment and shall make METOC data available for distribution to other NITES I and NITES II systems, as well as non-TESS(3)/NC systems requiring METOC data. Heterogeneous networked computing environment in this context shall mean software programs running on a DII COE approved platform on the same LAN or WAN with the METOC database. These software programs shall have access to the METOC data and products contained in the database through standard APIs.
- 3.2.1.10 Storage Requirements
- 3.2.1.10.1 The METOC Database shall be scaleable in size to efficiently support the range of requirements of installations ranging from production centers to unit level ships.
- 3.2.1.10.2 METOC database capacities shall take into account data element, descriptive information, and associated metadata storage requirements.
- 3.2.1.10.3 The METOC Database shall store data at full resolution, in original projection, and without loss of information. Data shall be stored as received from data ingest applications provided the ingested data does not violate any data integrity constraints established for those data.
- 3.2.1.10.4 The METOC Database shall support multi-user storing of METOC data to the database without corruption.

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- 3.2.1.10.5 The METOC Database access interface (i.e., store, retrieve, update, and delete operations) shall appear consistent to client applications.
- 3.2.1.10.6 The data management component shall store and update descriptive information (metadata) for all METOC data and products stored in the METOC database.
- 3.2.1.10.7 For all METOC Data sets, including products, the METOC Database shall store descriptive information. The descriptive data elements common across all METOC Database data types are defined in Table 3.2-1. Where applicable, each data element is cross-referenced to the equivalent DDM Standard Data Element (SDE) counter in the February 1997 edition of the DDM.

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Table 3.2-1. Descriptive Data Elements

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Type	Integer	Discrete	N/A	N/A	10 ⁰	4 bytes	N/A	Type of data (2-D Grid, 3-D Grid, Surface Observation, Upper Air Observation, Product, Image, etc).
Subtype	Char	ASCII String	N/A	N/A	N/A	1 byte/character	29435 (point observation); 36443 (analysis/ forecast)	Subtype of data contained in the dataset (e.g., METAR, SYNOPTIC, SPECI for surface observations).
Quality Indicator	Integer	ASCII String	N/A	N/A	N/A	2 bytes	36252 (point observation); no equivalent for grids	Code that denotes the pass or failure of quality checks.
Base Date and Time	Integer	Discrete	N/A	0 – 2 ³²⁻¹	10 ⁰	4 bytes	N/A	The date and time on which the analysis or forecast is based for an observation, bulletin, grid field, satellite image, or image product. It is specified in seconds since Jan 1, 1970 (Epoch time). For LLT observations, the date and time is the reported time of the observation. For grid field data, it is the central site (e.g., FNMOC or the model reported date and time. For satellite imagery and other products it is the date and time reported by the generating satellite system or product generating application.
Data Category	Integer	Discrete	N/A	N/A	10 ⁰	1 byte	N/A	A code designating the state of data relative to its original form. The categories are: base, edited, and derived. 0=Base, 1=Edited, 2=Derived. The definitions for these categories are provided in the Notes section.
Security Classification	Char	ASCII String	N/A	N/A	N/A	1 byte/character	26900	Security classification of the data.

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Table 3.2-1. Descriptive Data Elements

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Receipt Time	Integer	Discrete	Seconds	0 to 232-1	100	4 Byte	N/A	The date and time when the descriptive and, if provided, primary data for a discrete METOC data or product has been stored in the local METOC database. It is provided by the storing application and is specified in seconds since Jan. 1, 1970 (Epoch time).
Projection	Integer	Discrete	N/A	0 to 4	100	1 Byte	N/A	A code representing the standard type of projection (i.e. plane view representation over the Earth's surface) implicit in the METOC data or product stored in the database. 0=None, 1=Mercator, 2=Polar Stereographic, 3= Lambert Conformal, 4=Spherical.
Dynamic Product Indicator	Integer	Discrete	N/A	0 or 1	100	1 Byte	N/A	A boolean field indicating if the product is static or dynamic. 0=Static, 1=Dynamic.
Originating Site Name	Char	ASCII String	N/A	N/A	N/A	8 Bytes	N/A	An ASCII encoded name, acronym, or character set identifying the site originating the data. (e.g., KSFO, FNMOC).
Originating Site ID	Integer	Discrete	N/A	0 to 99999	100	4 Bytes	N/A	An numeric code identifying the site originating the data (e.g., WMO block number and station ID).
Data Receipt Method	Char	ASCII String	N/A	N/A	N/A	1 byte/character	N/A	Identifier for communications interface through which data was received.
Compression Indicator	Char	ASCII String	N/A	N/A	N/A	1 byte/character	36442	An ASCII String denoting the type of compression, if any, applied to the primary data prior to storing it in the database.

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Table 3.2-1. Descriptive Data Elements

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Primary Data Location	Char	ASCII String	N/A	N/A	N/A	1 byte/character	N/A	A referential identifier specifying the location of the primary data associated with these descriptive data elements. For primary data located in the DBMS, identifier is a database table name. For primary data located in a filesystem, the identifier is a path and filename. For primary data located on the Web, the identifier is a URL.
Region Type Code*	Integer	Discrete	N/A	0 to 5	100	1 Byte	14477	A code which describes a category of area on the surface of the earth associated with the dataset. 0 = Unknown 1=Rectangle, 2= Point, 3=Polygon, 4=Sector.
Region Name*	Char.	ASCII String	N/A	N/A	100	32 Bytes	23538	The name of the geographic area assigned to the dataset.
Point Latitude*	FP	Discrete	Degrees	-90.0 to +90.0	10-7	4 Bytes	42265	The coordinate identifying the location of point data relative to its distance from the Equator.
Point Longitude*	FP	Discrete	Degrees	-180.0 to +180.00	10-7	4 Bytes	42268	The coordinate identifying the location of point data relative to its distance from the Prime Meridian.
Number of Points*	Integer	Discrete	N/A	0 to 8	100	1 Byte	N/A	The number of endpoints representing the polygon region. For an n-sided polygon region, there will be n of Point Longitude and Point Latitude coordinate pairs.
Northwest Latitude*	FP	Discrete	Degrees	-90.0 to +90.0	10-7	4 Bytes	42265	The coordinate identifying the Northwest location of a bounding rectangle relative to its distance from the Equator.
Northwest Longitude*	FP	Discrete	Degrees	-180.0 to +180.0	10-7	4 Bytes	42268	The coordinate identifying the Northwest location of a bounding rectangle relative to its distance from the Prime Meridian.

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Table 3.2-1. Descriptive Data Elements

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Southwest Latitude*	FP	Discrete	Degrees	-90.0 to +90.0	10-7	4 Bytes	42265	The coordinate identifying the Southwest location of a bounding rectangle relative to its distance from the Equator.
Southwest Longitude*	FP	Discrete	Degrees	-180.0 to +180.0	10-7	4 Bytes	42268	The coordinate identifying the Southwest location of a bounding rectangle relative to its distance from the Prime Meridian.
Northeast Latitude*	FP	Discrete	Degrees	-90.0 to +90.0	10-7	4 Bytes	42265	The coordinate identifying the Northeast location of a bounding rectangle relative to its distance from the Equator.
Northeast Longitude*	FP	Discrete	Degrees	-180.0 to +180.0	10-7	4 Bytes	42268	The coordinate identifying the Northeast location of a bounding rectangle relative to its distance from the Prime Meridian.
Southeast Latitude*	FP	Discrete	Degrees	-90.0 to +90.0	10-7	4 Bytes	42265	The coordinate identifying the Southeast location of a bounding rectangle relative to its distance from the Equator.
Southeast Longitude*	FP	Discrete	Degrees	-180.0 to +180.0	10-7	4 Bytes	42268	The coordinate identifying the Southeast location of a bounding rectangle relative to its distance from the Prime Meridian.
Sector Radius1*	FP	Discrete	Nautical Miles	0.0 to 2000.0	10-1	4 Bytes	N/A	The outermost radius of a sector geographic region whose center point is defined by point data geographic location coordinates.
Sector Radius2*	FP	Discrete	Nautical Miles	0.0 to 2000.0	10-1	4 Bytes	N/A	The innermost radius of a sector geographic region whose center point is defined by point data geographic location coordinates.
Sector Start*	FP	Discrete	Degrees	0.0 to 360.0	10-1	4 Bytes	N/A	The angular position of the leftmost vertice of the sector region in degrees relative to True North.

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Table 3.2-1. Descriptive Data Elements

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Sector Extent*	FP	Discrete	Degrees	0.0 to 360.0	10-1	4 Bytes	N/A	The clockwise angular extent of the sector region in degrees relative to the leftmost sector vertice.

* These data elements pertain to geographic location of the data and products.

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3.2.1.11 Retrieval Requirements

- 3.2.1.11.1 The METOC Database shall support the retrieval of the descriptive information (metadata) associated with the METOC data and products stored in the METOC Database. In those cases where the METOC data or products are stored on other systems (e.g., AN/SMQ-11 imagery products), the METOC database shall only provide the descriptive information and reference information (e.g., directory and filename).
- 3.2.1.11.2 The METOC Database shall allow retrieval of METOC data and products according to the descriptive information (metadata) associated with the METOC data and products.
- 3.2.1.11.3 The METOC Database shall report database-access errors to the requesting application, and shall automatically recover from store errors without inducing a system abort.
- 3.2.1.11.4 The METOC Database shall provide a means to identify METOC dynamic database products that are updated automatically when new data contents are received.
- 3.2.1.11.5 The METOC Database shall support simultaneous and multi-user retrieval of data and products from the METOC database.
- 3.2.1.11.6 The METOC Database shall support access to data and products from the METOC database within the time periods defined in Table 6-A of the TESS(3)/NC Performance Specification.
- 3.2.1.11.7 The METOC Database shall support access to data and products from the METOC database within the time periods defined in Table 6-A of the TESS(3)/NC Performance Specification.

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3.2.1.12 The METOC Database shall support automated and/or operator initiated updates of data tables supporting the METOC database. Updates to data tables shall be a privileged operation granted to users or applications on a restricted basis subject to approval by the TESS(3)/NC Chief Engineer. Approved updates shall be supported electronically and/or locally via removable storage media (e.g., CD-ROM) and shall be performed only by operators designated by the System and/or Database Administrator.

3.2.1.13 The METOC Database shall provide a purge capability for data and products managed by the METOC Database. The purge criteria shall include: data type, data subtype, data age, source, size, and resource limit. Only operators designated by the system administrator shall be capable of initiating this function.

3.2.2 Grid Field Data Requirements

This section establishes the software requirements for the METOC Database Grid Field Data Segment (MDGRID).

3.2.2.1 MDGRID shall meet the general METOC Database requirements defined in Section 3.2.1.

3.2.2.2 MDGRID shall be registered and developed as a DII COE *shared database segment* and use a DII COE supplied COTS DBMS as the repository for decoded grid field data received by the NITES I system.

3.2.2.3 MDGRID shall create and maintain storage in the METOC Database for all decoded grid field data. MDGRID shall be capable of storing and maintaining up to 10,000 discrete grid field data sets. This capability shall include the model generated grid field datasets and the descriptive information (i.e., metadata) related to accessing or maintaining the data.

3.2.2.4 MDGRID shall store and maintain descriptive information for all grid field data stored in the METOC database. The descriptive information shall include any parametric or descriptive data necessary to fully identify the grid field data set (e.g., element, model) and support registration and geolocation of the grid field

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data values by user applications. This information shall include the common descriptive information defined in Section 3.2.1 and the grid field data unique descriptive information defined in Table 3.2-2. Each set of descriptive information shall be associated with one or more grid field datasets in the database.

- 3.2.2.5 MDGRID shall store and maintain model-generated grid field datasets. These datasets shall be received from the data management components, through grid data editing applications, or through applications producing grid data output on the local network.
- 3.2.2.6 MDGRID shall store the decoded grid field data at their full resolution, in their original projection, original vertical coordinate scheme, and without loss of information. Data shall be stored as received from data ingest applications provided the ingested data do not violate any data integrity constraints established for those data.
- 3.2.2.7 MDGRID shall prohibit changes to original decoded grid field data set values. No interpolation and/or merging of grid data fields shall be performed on datasets stored as Central Site originated. Modified or edited versions of the original data sets shall be stored as new datasets and marked as edited data by the editing application and owned by the editing application.
- 3.2.2.8 The MDGRID shall be capable of storing two-dimensional grid data sets. The data points shall be logically organized as a two-dimensional cartesian plane with the x and y coordinate axes populated according to the data set scan mode.
- 3.2.2.9 The MDGRID shall be capable of storing three-dimensional (volume) grid data sets. The data points shall be logically organized as a three-dimensional cartesian space with x, y, and z coordinate axes populated according to the data set scan mode and vertical coordinate parameter.
- 3.2.2.10 MDGRID shall support the retrieval of all available descriptive information records for the grid field data sets stored in the METOC database.

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- 3.2.2.11 MDGRID shall support the retrieval of all grid field datasets stored in the METOC database. The available grid field data sets are defined in Table 3.2-3. MDGRID shall allow retrieval of grid field data by Element, Model Name, Level, Base Time, and Forecast Period. MDGRID shall be capable of returning an entire two-dimensional or three-dimensional grid field data set. The returned data set shall be returned in its original projection and resolution.
- 3.2.2.12 The MDGRID shall support the dynamic creation of new data models and datasets. Creation of new data models shall be a privileged operation and restricted to system administration functions. This capability shall include adding new models, elements, levels, base times, forecast periods, and resolutions.
- 3.2.2.13 MDGRID shall enforce discretionary access control for grid field data and grant application access to the descriptive information and computed grid field data according to Table 3.2-3. The table identifies privileges by data category and application group.
- 3.2.2.14 The privileges granted shall include Insert, Update, Select, and Delete for tables and views and execute privileges for stored procedures and functions.
- 3.2.2.15 The following performance requirements apply to MDGRID when the METOC database is fully populated with grid field data and the NITES I system hosting the METOC Database is in the multi-user LAN configuration:
- 3.2.2.15.1 MDGRID shall return a summary listing of all available grid field datasets in the database within 1 minute of the summary listing request.
- 3.2.2.15.2 MDGRID shall return a single complete grid field dataset within 20 CPU seconds (of a Hewlett-Packard J210) of the dataset request.
- 3.2.2.15.3 MDGRID shall return 10 complete grid field datasets within 2 minutes of a multiple dataset request.
- 3.2.2.15.4 MDGRID shall be capable of storing a single decoded grid field dataset, including descriptive information, within five seconds.

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- 3.2.2.16 The following performance requirements apply to MDGRID when the METOC Database is fully populated with grid field data and the NITES I system hosting the METOC Database is in the multi-user WAN configuration:
- 3.2.2.16.1 MDGRID shall return a summary listing of all available grid field datasets available in the database within five minutes of the summary listing request.
- 3.2.2.16.2 MDGRID shall return a single complete grid field dataset within one minute of the dataset request.
- 3.2.2.16.3 MDGRID shall return 10 complete grid field datasets within five minutes of the multiple dataset request.

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Table 3.2-2. Grid Field Data Descriptive Information

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Element Type	Integer	Discrete	N/A	0 to 255	100	1 byte		Indicator for type of grid data contained in the data set (e.g., pressure, temperature). The value corresponds to the equivalent value in Table 2 of the WMO FM-92 VIII GRIB specification.
Model Name	ASCII	String	N/A	See Note 1	N/A	32 bytes		Name of the algorithmic model used to generate the grid data set.
Level Type	Integer	Discrete	N/A	0 to 250	100	1 byte		Indicator for type of vertical coordinate used to indicate height associated with the Element Type (e.g., hectopascals).
Level Value	Integer	Discrete	Variable	see WMO-306 FM-93 GRIB, Tables 3 & 3a	N/A	4 bytes		Vertical coordinate associated with the elements contained in the grid data set. The units associated with the values are defined in Tables 3 and 3a of the WMO-306 FM-92 VIII GRIB specification
Number of Levels	Integer	Discrete	N/A	see WMO-306 FM-93 GRIB, Tables 3 & 3a	N/A	1 byte		Vertical coordinate associated with the elements contained in the grid data set. The units associated with the values are defined in Table 3 and 3a of the WMO-306 FM-92 VIII GRIB specification
Unit of Measure	ASCII	String	N/A	Variable 2	N/A	32 bytes		ASCII representation for the unit of measure associated with a particular grid field data set. E.g., "m/s" for meters per second.
Forecast Hour	Integer	Discrete	Hours	0.0 - 240.0	10-1	4 Byte	36830	The quantity of time between the valid time of a forecast and its associated basetime (e.g., 12 hour forecast). Also referred to as tau.
Grid Start Latitude	Integer	Discrete	Degrees	-90 to +90	100	2 Bytes	N/A	The latitude coordinate identifying the location of the first grid point relative to its distance from the Equator.
Grid Start Longitude	Integer	Discrete	Degrees	-180 to +180	100	2 Bytes	N/A	The longitude coordinate identifying the location of the first grid point relative to its distance from the Prime Meridian.

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Table 3.2-2. Grid Field Data Descriptive Information

Name	Type	Format	Units	Range	Precision	Size	DDM SDE Counter	Description
Grid End Latitude	Integer	Discrete	Degrees	-90 to +90	100	2 Bytes	N/A	The latitude coordinate identifying the location of the last grid point relative to its distance from the Equator.
Grid End Longitude	Integer	Discrete	Degrees	-180 to +180	100	2 Bytes	N/A	The longitude coordinate identifying the location of the last grid point relative to its distance from the Prime Meridian.
Grid Pts. in X-Direction	Integer	Discrete	N/A	0 to 65535	100	2 Byte	N/A	The number of points along the x-axis (or latitude circle) included on the grid.
Grid Pts. in Y-Direction	Integer	Discrete	N/A	0 to 65535	100	2 Byte	N/A	The number of points along the y-axis (or longitude meridian) included on the grid.
Grid Long. Increment	Integer	Discrete	Degrees	0 to 65535	100	2 Bytes	N/A	The increment between grid points along the longitudinal meridian.
Grid Lat. Increment	Integer	Discrete	Degrees	0 to 65535	100	4 Bytes	N/A	The increment between grid points along the latitude circle.
Scan Mode	Integer	Discrete	N/A	0, 32, 64, 96, 128, 160, 192, 224	100	1 byte		Defines the ordering of the grid field data points in terms of +/- i and +/- j direction. See Code Table 8 of WMO FM-92 VIII GRIB specification.

Note: Central Site provided models are added, changed, and deleted on periodic basis. Appendix A defines the supported grid field model set for NITES I and II.

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Table 3.2-3. Grid Field Data Types

Name1	Type	Format	Units	Range	Precision	Size2	Description
Air Temperature	Float	2d	Degrees K	163.0 to 336.0	10-1	270kb	The temperature of the air estimated by an air temperature analysis forecast model.
Air Pressure	Float	2d	hectopascals	0.001 to 1100.0	10-3	270kb	The estimated air pressure of an atmospheric pressure analysis forecast model.
Wind U Component	Float	2d	Meters/Second	-200.0 to 200.0	10-1	270kb	The estimated rate of wind movement in the West to East direction.
Wind V Component	Float	2d	Meters/Second	-200.0 to 200.0	10-1	270kb	The estimated rate wind movement in the South to North direction.
Geopotential Height	Integer	2d/3d	Geopotential Meters	-400 to 99999	100	270kb	The height of a point in the atmosphere expressed in units proportional to the geopotential at that height.
Total Precipitation	Float	2d	Centimeters	0.0 to 999.9	10-1	270kb	The estimate depth of precipitation as calculated from a merge of cloud type derived precipitation and satellite present weather and rainfall estimates. It is the depth of the precipitation that accumulated during the preceding 12 or 24 hour period.
Freezing Level	Float	2d	Meters	0.0 to 20000.0	10-1	270kb	Level of the 0° C isotherm.
Frontal Analysis	Float	2d	C/km2 x 1e4		10-1	270kb	Gradient of the gradient of potential temperature (GG Theta)
Total Cloud Cover	Integer	2d	Percent	0 to 100	100	270kb	The estimated rate of the sky dome that is covered by clouds.
Fog Probability	Integer	2d	Percent	0 to 100	100	270kb	The estimated rate of probability of the occurrence of fog.

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Table 3.2-3. Grid Field Data Types

Name1	Type	Format	Units	Range	Precision	Size2	Description
Sea Surface Temperature	Float	2d/3d	Degrees C	-2.0 to 45.0	10-1	270kb	The estimate temperature of the water at the surface of the ocean.
Wind Wave Height	Float	2d	Meters	0.00 to 50.00	10-2	270kb	Mean height of wind-generated waves measured from trough to crest
Significant Wave Height	Float	2d	Meters	0.00 to 50.00	10-2	270kb	The mean height of the highest one third waves measured from trough to crest.
Primary Wave Period	Integer	2d	Seconds	0 to 14	100	270kb	Time required for two successive primary wave crests to pass a fixed point
Primary Wave Direction	Integer	2d	Degrees True North	000 to 359	100	270kb	Mean angle measured clockwise from true north to the direction from which primary waves are coming
Swell Wave Height	Float	2d	Meters	0.00 to 50.00	10-2	270kb	The mean height of swell waves measured from trough to crest.
Swell Wave Period	Float	2d	Seconds	0.0 to 99.9	10-1	270kb	The quantity of time required for two successive swell wave crests to pass a fixed point.
Swell Wave Direction	Integer	2d	Degrees True	0 to 359	100	270kb	The mean angle measure clockwise from true North to the direction from which the swell waves are coming.

Notes:

1. The grid field names used here are from Table 6A in the TESS(3)/NC Performance Specification dtd 5/2/97.
2. Sizes are based on the FNMOC generated 1⁰ OASIS NOGAPS model comprised of 181x360 grid points.

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The following table identifies access privileges for MDGRID. It specifies Privilege by data category and application.

Table 3.2-4. MDGRID Access Privileges

Privilege	Level	Base Data	Edited Data
Connect to Database	Database	NITES I, II Applications, Approved non-NITES Applications.	NITES I, II Applications, Approved non-NITES Applications.
Insert (Store)	Table, View	NITES I Data Management Applications.	NITES I, II Editing Application.
Update (Update)	Table, View	NITES I Data Management Applications.	NITES I, II Editing Application.
Select (Read)	Table, View	NITES I, II Applications, Approved non-NITES Applications.	NITES I, II Applications, Approved non-NITES Applications.
Delete (Delete)	Table, View	NITES I Data Management Applications.	NITES I, II Editing Applications (owner).
Execute (Execute)	Procedure, Function	NITES I Data Management Applications.	NITES I Data Management Applications.

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3.2.3 Observational Data Requirements

This section establishes the software requirements for observational data for TESS(3)/NC. Observational data consists of observed measurements of weather parameters obtained from reporting stations, local sensors sources, and remote sensors including satellite. Conceptually, observation data are similar in that human, mechanical, or electrical sensor devices provide the observed measurements of the atmospheric or oceanographic environment. In terms of logical and physical format and content, however, observations, can be categorized. The categories or types of observation data supported by the METOC Database are LLT (i.e., Latitude, Longitude, Time), Textual/Bulletin, and Remotely Sensed. The following requirements apply to each observation data type.

- 3.2.3.1 The METOC Database observations segments shall meet the general METOC Database requirements defined in Section 3.2.1.
- 3.2.3.2 The METOC Database observational segments shall create and maintain storage in the NITES I or NITES II system for all observational data sets.
- 3.2.3.3 The METOC Database shall be capable of storing and maintaining up to 50,000 discrete observation datasets. This capability shall include the observed weather parameter data elements any descriptive information (i.e., metadata), and referential data related to accessing or maintaining the data.
- 3.2.3.4 The METOC Database observation data descriptive information shall include any parametric or descriptive data necessary to fully identify the observation data set (e.g., station ID) and support geolocation (by point or region) of the observation data set by user applications. This information shall include the common descriptive information defined in Section 3.2.1 and the observation data unique descriptive information defined in Table 3.2-6. Each set of descriptive information shall be associated with one or more observation data records in the database or provide referential information to other databases (e.g., remote sensor satellite system database).

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3.2.3.5 LLT Observational Data Description

3.2.3.5.1 LLT observation data is considered point data associated with a specific geographic point (i.e., reporting station location) and time. Depending on the type of LLT observation, the observed values in the observation are decoded from the message and stored as discrete fields associated with an observation type. The observed values can then be plotted on a display or processed algorithmically.

3.2.3.6 LLT Observational Data Requirements

3.2.3.6.1 The METOC Database shall provide a database segment identified as MDLLT. This segment shall be a DII COE shared database segment and use a DII COE supplied COTS DBMS as the repository for LLT observation data received by the NITES I or NITES II system.

3.2.3.6.2 MDLLT shall support the retrieval of all descriptive information records for the LLT observation data sets stored on the NITES I system.

3.2.3.6.3 MDLLT shall support the automated update of data tables required to store new observation data types and reports. This support shall include making the new data types and reports available to user applications. MDLLT shall also support the modification of quality control limits applied to incoming observation data. The support shall include modifying the range of acceptable values (data integrity constraints) for each observational data element. This capability shall be limited to NITES I approved data management applications.

3.2.3.6.4 MDLLT shall store and maintain LLT observation datasets. These datasets shall be received from the Filter and Alert CSCI and NITES I or II observation data editing applications. The datasets shall be stored without loss of information as received from the data ingest applications provided the data does not violate any data integrity constraints established for that data.

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- 3.2.3.6.5 MDLLT shall prohibit changes to original decoded observation data set values. No interpolation and/or merging of observation data fields shall be performed on datasets received from or stored as Central Site originated. Modified or edited versions of the original observation datasets shall be stored as new datasets, marked as edited data by the editing application, and owned by the editing application.
- 3.2.3.6.6 MDLLT shall support the retrieval of LLT observation datasets stored in the METOC database. The types of LLT observations available are defined in Table 3.2-6. MDLLT shall allow retrieval of LLT observation datasets by the following criteria (where applicable to the observation type):
- A. Observation Type
 - B. Observation Subtype
 - C. Observation Station Type,
 - D. WMO block number
 - E. WMO Station ID
 - F. Time range
 - G. Geographic area
 - H. Discrete data field and value
 - I. Discrete data field and range of values.
- 3.2.3.6.7 MDLLT shall store and maintain the decoded observation data for the types of observations defined in Table 3.2-6. Table 3.2-6 describes the observation types supported and the associated WMO Alphanumeric codes and BUFR sequences.
- 3.2.3.6.8 The MDLLT shall provide for the storage of fields from decoded BUFR messages sequences from “WMO-306-1995 Edition, Suppl. No. 1 (X.1996) FM-94 BUFR” as specified in Table 3.2.3-3 located in Appendix A of this document.

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Table 3.2-5. Observation Data Descriptive Information

Name	Type	Format	Units	Range	Precision	Size	Description
Observation Type	Integer	Discrete	N/A	0 to 255	100	1 Byte	Type of observation within the general observation subtype category (e.g., LLT - Surface Observation)
Observation Subtype	Integer	Discrete	N/A	0 to 255	100	1 Byte	Subtype of observation within the Observation Type category (e.g., Warning - SIGMET).
Observing Station Type	ASCII	String	N/A	N/A	N/A	16 Bytes	WMO ASCII identifier associated with the observing station reporting the observation. The identifier is observation type/subtype dependent (e.g., ICAO number, Platform ID, Aircraft ID, ship ID)
WMO Block Number	Integer	Discrete	N/A	0 to 99	100	1 Byte	A two-digit WMO defined code identifying the area of the world in which the reporting station is located.
WMO Station ID	Integer	Discrete	N/A	0 to 999	100	2 Bytes	A three-digit WMO defined code identifying the station within the area defined by the WMO Block Number.

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Table 3.2-6. Observation Data Types

Type	Description	WMO Alphanumeric Code	WMO BUFR Sequence
Fixed Surface Station Synoptic Reports	Synoptic report from surface stations reported at regular intervals.	FM-12	3-07-001 3-07-002 3-07-003 3-07-004 3-07-005 3-07-006 3-07-007 3-07-008 3-07-009
Ship Synoptic Reports	Synoptic report from ships reported at regular intervals.	FM-13	3-08-004
Mobile Surface Station Synoptic Reports	Synoptic reports from mobile land stations reported at regular intervals	FM-14	No equivalent
METAR/SPECI	Aviation Routine Weather Reports and Aviation Selected Special Weather Report.	FM-15	3-07-011
Fixed Buoy Report	Reports from fixed ocean buoys	FM-18	3-08-001 3-08-002
Drifting Buoy Report	Reports from drifting ocean buoys	FM-18	3-08-003
Radar Observation	Radar observation from a ground radar station	FM-20	3-21-004
Upper Air Winds Reported at pressure levels from fixed land station	Upper air report from a surface station that reports only wind information at standard and significant isobaric levels that was take from a fixed land station.	FM-32	3-09-003 3-09-004
Upper Air Winds Reported at pressure levels from sea station	Upper air report from a surface station that reports only wind information at standard and significant isobaric levels that was take from a sea station.	FM-33	No equivalent

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Table 3.2-6. Observation Data Types

Type	Description	WMO Alphanumeric Code	WMO BUFR Sequence
Upper Air Winds Reported at pressure levels from a mobile land station	Upper air report from a surface station that reports only wind information at standard and significant isobaric levels that was take from a mobile land station.	FM-34	3-09-012 3-09-016 3-09-019
Upper Air Temperature Report at pressure levels from a fixed land station	Upper air report from a surface fixed land station that reports wind and temperature information at standard and significant isobaric levels.	FM-35	3 09 005 3 09 006 3 09 007 3 09 008
Upper Air Temperature Report at pressure levels from a ship station	Upper air report from a ship station that reports wind and temperature information at standard and significant isobaric levels.	FM-36	3 09 013 3 09 014 3 09 017 3 09 018
Upper Air Temperature Report at pressure levels from a drop sonde	Upper air report from a sonde dropped from a balloon or aircraft station that reports wind and temperature information at standard and significant isobaric levels.	FM-37	No equivalent
Upper Air Temperature Report at pressure levels from a fixed land station	Upper air report from a surface fixed land station that reports wind and temperature information at standard and significant isobaric levels.	FM-38	No equivalent
Upper Air Winds Reported at heights from a surface station	Upper air reports from a surface station that reports only wind information at geo-potential heights.	FM-39	3-09-011
Upper Air Winds Reported at heights from a ship	Upper air reports from a ship station that reports only wind information at geo-potential heights.	FM-40	3-09-011
Reports from Aircraft	Reports from aircraft	FM-41, FM-42 ICAO Aireps	03-11-001
Aerodrome Forecast	Reports and forecast from airfields	FM-51	
Bathy Report	Report of a bathythermal observation	FM-63	3-15-001
TESAC	Temperature, Salinity and current reports from a sea station	FM-64	3-15-002

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3.2.3.7 Textual Observational Data Description

Textual observational data are primarily ASCII formatted forecasts or bulletin/warning oriented messages. Textual LLT observation data can be associated with a specific geographic point and time, but more generally are associated with a geographical area or region. Types include Forecast Reports, Warnings, and Notices. Depending on the type of textual observation, the reporting station or organization and the area or region affected is decoded and stored along with the textual portion of the message. Textual observation data are typically displayed as text by a client application.

3.2.3.8 Textual Observational Data Requirements

- 3.2.3.8.1 The METOC Database shall provide a database segment identified as MDTXT. This segment shall be a DII COE *shared database segment* and use a DII COE supplied COTS DBMS as the repository for the textual observation data received by the NITES I or NITES II system.
- 3.2.3.8.2 MDTXT shall meet the general METOC Database requirements defined in section 3.2.1.
- 3.2.3.8.3 MDTXT shall create and maintain storage in the NITES I or NITES II system for all decoded textual observational data. MDTXT shall be capable of storing and maintaining the entire contents of the textual message (i.e. the text), the descriptive information (e.g., area, type, etc.), and metadata required to access or maintain the data.
- 3.2.3.8.4 MDTXT shall receive decoded textual observation data from the Filter and Alert CSCI and NITES I or II textual observation data editing applications. The datasets shall be stored without loss of information as received from the data ingest applications provided the data does not violate any data integrity constraints established for that data.

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3.2.3.8.5 MDTXT shall provide for the storage, retrieval, and deletion of the textual observations and bulletins specified in Table 3.2-7 as defined in WMO-386 tables A and B1.

Table 3.2-7. Textual Observation Data Types

Type	Table A Designator	Table B1 Designator
Forecast Reports	F	E = Extended Forecast H = Upper Air Thickness I = Iceberg J = Radio Warning Service K = Tropical Cyclone Advisories L = Local Area Forecasts M = Temperature Extremes O = Guidance Q = Other Shipping V = Volcanic Ash W = Winter Sports X = Miscellaneous
Surface Reports	S	T = Sea Ice U = Snow Depth X = Miscellaneous
Satellite Data	T	B = Satellite Orbit Parameters X = Miscellaneous
Upper Air	U	X = Miscellaneous
Warnings	W	A = AIRMET/SIGMET C = Tropical Cyclone (SIGMET) D = Tropical Cyclone Discussion E = Tsunami F = Tornado (USAF) G = River Flood H = Hurricane M = High Seas (USAF) O = Other S = SIGMET T = Tropical Cyclone (Typhoon) U = Severe Thunderstorm V = Volcanic Ash (SIGMET) W = Warnings and Summaries W = Military Weather Warnings (USAF) X = Misc. Weather Warnings (USAF)

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Table 3.2-7. Textual Observation Data Types

Type	Table A Designator	Table B1 Designator
Notices	N	G = Hydrological H = Marine N = Nuclear Emergency O = METNO/WIFMA P = Product generation delay T= Test Message W = Warning Related or Cancellation

3.2.3.8.6 MDTXT shall prohibit changes to the decoded observation data and the message text. Modified or edited versions of the original textual observation shall be stored as new textual observation and marked as edited data by the editing application, and owned by the editing application.

3.2.3.8.7 MDTXT shall support the retrieval of textual observations stored in the METOC database. The types of textual observations available are defined in Table 3.2-7. MDTXT shall allow retrieval of observations by the following criteria:

- A. Observation Type
- B. Observation Subtype
- C. Observation Station Type (if available)
- D. WMO block number (if available)
- E. WMO Station ID (if available)
- F. Report time range
- G. Forecast time
- H. Report type
- I. Geographic area.

3.2.3.8.8 MDTXT shall enforce discretionary access control for textual observation data and grant application access to the descriptive information and textual data according to Table 3.2-8. The table identifies privileges by data category and application group.

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Table 3.2-8. MDTXT Access Privileges

Privilege	Level	Decoded Data	Edited Data
Connect to Database	Database	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Insert (Store)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Update (Update)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Select (Read)	Table, View	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Delete (Delete)	Table, View	NITES I Data Management Applications	NITES I, II Editing Applications (owner)
Execute (Execute)	Procedure, Function	NITES I Data Management Applications	NITES I Data Management Applications

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3.2.3.9 Remotely Sensed Data Requirements

Remotely sensed observational data are observations derived from specific sensors on DMSP, TIROS, GOES, and remote ocean sensing systems satellites. These data sets are earth-locatable and reported as individual satellite sensor readouts. Generally, these observations are recorded and associated with a track, profile, or swath of individual sensor readouts and therefore have multi-dimension aspects making the data distinct from LLT or Textual observation types. Sources include TIROS Operational Vertical Sounder (TOVS), ARGOS, and Special Sensor Microwave Imager (SSM/I) sensors. Raw remote sensor data is generally pre-processed by satellite acquisition software and earth located prior to display or use by METOC decision aid programs.

3.2.3.10 Remotely Sensed Observational Data Requirements

3.2.3.10.1 The METOC Database shall provide a database segment identified as MDREM. This segment shall be a DII COE *shared database segment* and use a DII COE supplied COTS DBMS as the repository for remotely sensed observation data received or otherwise available to the NITES I or NITES II system.

3.2.3.10.2 MDREM shall meet the general METOC Database requirements defined in Section 3.2.1.

3.2.3.10.3 MDREM shall create and maintain storage in the METOC Database for remotely sensed observation data received by the NITES I or II system. MDREM shall be capable of storing and maintaining the pre-processed, remotely sensed data, the descriptive information (e.g., area, satellite type, sensor type), and metadata required to access or maintain the data.

3.2.3.10.4 MDREM shall receive pre-processed remotely sensed observation data from the Satellite Analysis and Viewer CSCI and NITES I or II remote sensor observation data editing applications. The datasets shall be stored without loss

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of information as received from the data ingest applications provided the data does not violate any data integrity constraints established for that data.

- 3.2.3.10.5 MDREM shall provide for the storage, retrieval, and deletion of remotely sensed Sea Surface Temperature data.
- 3.2.3.10.6 MDREM shall provide for the storage, retrieval, and deletion of Rain Rate from SSM/I specified in Table 3.2-9.
- 3.2.3.10.7 MDREM shall provide for the storage, retrieval, and deletion of SSMT/1 parameters specified in Table 3.2-10.
- 3.2.3.10.8 MDREM shall provide for the storage, retrieval, and deletion of NOAA TOVS parameters specified in Table 3.2-11.
- 3.2.3.10.9 MDREM shall provide for the storage, retrieval, and deletion of SSMT/2 parameters specified in Table 3.2-12.
- 3.2.3.10.10 MDREM shall provide for the storage, retrieval, and deletion of GFO parameters specified in Table 3.2-13.
- 3.2.3.10.11 MDREM shall provide for the storage, retrieval, and deletion of GOES parameters specified in Table 3.2-14.
- 3.2.3.10.12 MDREM shall provide for the storage, retrieval, and deletion of METEOSAT parameters specified in Table 3.2-15.
- 3.2.3.10.13 MDREM shall provide for the storage, retrieval, and deletion of GOMS parameters specified in Table 3.2-16.
- 3.2.3.10.14 MDREM shall provide for the storage, retrieval, and deletion of INSAT parameters specified in Table 3.2-17.
- 3.2.3.10.15 MDREM shall provide for the storage, retrieval, and deletion of FENG YUN parameters specified in Table 3.2-18.

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- 3.2.3.10.16 MDREM shall provide for the storage, retrieval, and deletion of Cloud Track Wind parameters as specified in Table 3.2-19.
- 3.2.3.10.17 MDREM shall provide for the storage, retrieval, and deletion of Scatterometry parameters as specified in Table 3.2-20.
- 3.2.3.10.18 MDREM shall provide for the storage, retrieval, and deletion of GMS parameters as specified in Table 3.2-21.
- 3.2.3.10.19 MDREM shall prohibit changes to the remotely sensed observation data. Modified or edited versions of the original data shall be stored as new remotely sensed observations and marked as edited data by the editing application, and owned by the editing application.
- 3.2.3.10.20 MDREM shall support the retrieval of remotely sensed observation data stored in the METOC database. The types of textual observations available are defined in Table 3.2-22. MDREM shall allow retrieval of observations by the following criteria:
- A. Observation Type
 - B. Observation Subtype
 - C. Sensor Type
 - D. Channel Number
 - E. Observation time
 - F. Geographic area.
- 3.2.3.10.21 MDREM shall enforce discretionary access control for remotely sensed observation data and grant application access to the descriptive information and pre-processed data according to Table 3.2-22. The table identifies privileges by data category and application group.

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Table 3.2-9. SSM/I Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Surface Wind Speed over water	Integer	Range	m/s	3 – 25	1	1 Byte	Surface wind speed (available only over water).
Precipitable Water	Integer	Range	kg/m2	0-128	1	1 Byte	Precipitable water content in the column.
Cloud Liquid Water Content	Integer	Range	kg/m2	0-128	1	1 Byte	Cloud liquid water content in the column.
Soil Moisture Field	Integer	Range	N/A	N/A	1	1 Byte	Soil moisture content (dry – saturated).
Surface Temperature	Integer	Range	Celsius	-60 - 60	1	1 Byte	Surface (skin) temperature (land or sea).
Surface Type	Integer	Range	N/A	0-255	1	1 Byte	Surface type (current types are LAND, OCEAN, ICE, POSSIBLE ICE, ANTARCTICA, and COAST).
Ice Concentration	Integer	Range	per cent	0-100	1	1 Byte	Ice concentration on water.
Ice Edge	Boolean	Binary	N/A	1 = edge 0 = not an edge	1	1 Byte	Indicates whether a particular scene station contains an ice edge.
Ice Age	Integer	Range	N/A	N/A	1	2 Bytes	Ice age (first year, multiyear).
Rain Rate	Integer	Range	mm/hr	0-255	1	1 Byte	Rain Rate.
19H Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 19GHz horizontally polarized channel.
19V Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 19GHz vertically polarized channel.
22H Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 22GHz horizontally polarized channel.
38H Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 38GHz horizontally polarized channel.
38V Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 38GHz vertically polarized channel.

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Table 3.2-9. SSM/I Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
85H Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 85GHz horizontally polarized channel.
85V Brightness Temperature	Integer	Range	°K	0-400	1	2 Bytes	Corrected brightness temperature for 85GHz vertically polarized channel.

Table 3.2-10. SSMT/1 Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Level	Integer	Range	Hectopascals	0-1100	N/A	2 Bytes	Isobaric Pressure Level.
Temperature	Float	Range	Degrees Celsius	-60.0 - 60.0	10 -1	4 Bytes	Temperature at given level.
Height	Integer	Range	Meters	0 - 30000	N/A	1 Byte	Height at given level.
Thickness between Layers	Integer	Range	Meters	0 - 2000	N/A	2 Bytes	Height Difference between layers.
Geostrophic Winds at Pressure Levels	Integer	Range	m/s	0-1000	N/A	2 Bytes	Geostrophic wind at the given pressure level.
Thermal Winds between layers	Integer	Range	m/s	0-1000	N/A	2 Bytes	Vertical shear of the geostrophic wind between levels.
Pressure at Tropopause	Integer	Range	mb	10 - 400	N/A	2 Bytes	Pressure at the tropopause level.
Tropopause Temperature	Float	Range	Degrees Celsius	-60 - 60	10 -1	4 bytes	Temperature at the tropopause level.

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Table 3.2-11. TOVS Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Geopotential Height	Integer	Range	geopotential meters	0 - 30000	N/A	2 Bytes	Geopotential height of a level.
Temperature	Float	Range	degrees Celsius	-60.0 - 60.0	10 -1	4 Bytes	Temperature at the level.
Mixing Ratio	Float	Range	kg kg-1	0.0 – 100.0	10-5	4 Bytes	Mixing ratio at the level.

Table 3.2-12. SSMT/2 Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Geopotential Height	Integer	Range	geopotential meters	0 - 30000	N/A	2 Bytes	Geopotential height of a level.
Relative Humidity	Integer	Range	percent	0-100	N/A	1 bytes	Relative humidity at the level.
Specific Humidity	Integer	Range	kg kg-1	0.0-100.0	N/A	4 Bytes	Specific humidity at the level.
Dew Point	Float	Range	Celsius	-60 - 60	N/A	4 bytes	Dew point temperature at the level.
Dew Point Depression	Float	Range	Celsius	-60 - 60	N/A	4 bytes	Dew point depression at the level.
Air Mass Type							
Water Vapor Mass	Float	Range	kg/m				

Table 3.2-13. GFO Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Sea Surface height	Float	Range	meters	0 – 30	10-1	2 Bytes	Height of the sea surface above datum.
Significant Wave Height	Integer	Range	meters	0 - 40	N/A	2 Bytes	Mean height of the highest 1/3 of waves.
Wind Speed	Integer	Range	m/s	0-100	N/A	2 Bytes	Wind speed at the sea surface.
Ice Index							

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Table 3.2-13. GFO Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Water Vapor							

Table 3.2-14. GOES Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Visible	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Corrected brightness temperature in the visible channel.
Infra Red	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Corrected brightness temperature in the infrared channel.
Far Infra-Red	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Corrected brightness temperature in the far infrared channel.
Near Infra-Red	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Corrected brightness temperature in the near infrared channel.
Water Vapor	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Corrected brightness temperature in the brightness channel.

Table 3.2-15. METEOSAT Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
AV	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format visible channel brightness temperature.
AI	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format infrared channel brightness temperature.
BW	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format water vapor channel brightness temperature.
AIV	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format infrared and visible channel brightness temperatures.

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Table 3.2-15. METEOSAT Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
AIW	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format infrared and water vapor channel brightness temperatures.
AIVW	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format all channels brightness temperatures.
AIVH	Integer	Range	°K	-173 - 318	N/A	2 Bytes	A-format infrared and visible channel brightness temperatures – reduced resolution in visible channel.
BV	Integer	Range	°K	-173 - 318	N/A	2 Bytes	B-format visible channel brightness temperature.
BI	Integer	Range	°K	-173 - 318	N/A	2 Bytes	B-format infrared channel brightness temperature.
BW	Integer	Range	°K	-173 - 318	N/A	2 Bytes	B-format water vapor channel brightness temperature
BIV	Integer	Range	°K	-173 - 318	N/A	2 Bytes	B-format infrared and visible channel brightness temperatures.
BIVW	Integer	Range	°K	-173 - 318	N/A	2 Bytes	B-format all channels brightness temperatures.
GOES Relay	Integer	Range	°K	-173 - 318	N/A	2 Bytes	

Table 3.2-16. GOMS Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Infra-red	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Infrared channel brightness temperature.
Visible	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Visible channel brightness temperature.
Water-Vapor	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Water vapor channel brightness temperature.

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Table 3.2-17. INSAT Parameters

This table is TBD.

Field Name	Type	Format	Units	Range	Precision	Size	Description

Table 3.2-18. FENG YUN Parameters

Field Name	Type	Format	Units	Range	Precision	Size	Description
Infra-red	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Infrared channel brightness temperature.
Visible	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Visible channel brightness temperature.
Water-Vapor	Integer	Range	°K	-173 - 318	N/A	2 Bytes	Water vapor channel brightness temperature.

Table 3.2-19. Cloud Track Winds

Field Name	Type	Format	Units	Range	Precision	Size	Description
Level	Integer	Range	gpm	0 - 30000	N/A	2 Bytes	Level of wind report.
Wind U component	Integer	Range	m/s	0-100	1	2 Bytes	Northward component of wind at reported level.
Wind V component	Integer	Range	m/s	0-100	1	2 Bytes	Eastward component of wind at reported level.

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Table 3.2-20. Scatterometry

Field Name	Type	Format	Units	Range	Precision	Size	Description
Wind Speed	integer	range	m/s	0-100	N/A	4 Bytes	Wind speed.
Wind Direction	integer	range	degrees	0-359	N/A	2 Bytes	Wind direction.

Table 3.2-21. GMS

This Table is TBD.

Field Name	Type	Format	Units	Range	Precision	Size	Description

Table 3.2-22. MDREM Access Privileges

Privilege	Level	Decoded Data	Edited Data
Connect to Database	Database	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Insert (Store)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Update (Update)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Select (Read)	Table, View	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Delete (Delete)	Table, View	NITES I Data Management Applications	NITES I, II Editing Applications (owner)
Execute (Execute)	Procedure, Function	NITES I Data Management Applications	NITES I Data Management Applications

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3.2.4 Imagery Data Requirements

METOC Database imagery data consists of standard format raster display products (e.g., GIF) generated by an analysis or decision aid application. These display products are typically generated by satellite ingest and display, Weather forecasting and analysis, or METOC decision aid programs local or external to TESS(3)/NC systems. The types of imagery products supported include AN/SMQ-11 projected imagery, NSDS-G/E projected imagery, METOC application screen captures, briefing slides, and standard format WWW products. Imagery data consists of descriptive information describing the characteristics of the data and either the entire standard product or product definitions that reference geographic location (region or point), primary datasets, operator annotations, other products, and/or processing routines necessary to regenerate a standard display product. The following requirements apply to imagery data..

- 3.2.4.1 The METOC Database shall provide an imagery database segment identified as MDIMG. This segment shall be a DII COE *shared database segment* and use a DII COE supplied COTS DBMS as the repository for imagery data received by the NITES I or NITES II system.
- 3.2.4.2 MDIMG shall meet the general METOC Database requirements defined in section 3.2.1.
- 3.2.4.3 MDIMG shall create and maintain storage in the NITES I or NITES II system for imagery data received by the NITES I or NITES II system. MDIMG shall be capable of storing and maintaining the entire image dataset, (i.e. the picture), the descriptive information (e.g., area, type, etc.), and metadata required to access or maintain the data.
- 3.2.4.4 MDIMG shall receive imagery data from the Satellite Analysis and Viewer CSCI, Filter and Alert CSCI, Weather Forecast and Analysis CSCI, Office Tools CSCI, and NITES I or II imagery generating applications. The datasets shall be stored without loss of information as received from the data ingest application provided the data does not violate any data integrity constraints established for that data.

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- 3.2.4.5 MDIMG shall provide for the storage, retrieval, and deletion of the imagery products identified in Table 6C and 6D of the TESS(3)/NC Performance Specification. Imagery data formats support shall include, at a minimum:
1. NITF
 2. GIF
 3. TIFF
 4. BMP
 5. JPEG
 6. XWD
 7. XBM
 8. PBM
 9. MPEG.
- 3.2.4.6 MDIMG shall prohibit changes to the stored imagery data. Application modified or edited versions of the imagery shall be stored as new data sets and marked as edited data by the editing application, and owned by the editing application.
- 3.2.4.7 MDIMG shall support the retrieval of imagery data stored in the METOC database. MDIMG shall allow retrieval of imagery data by the following criteria:
- A. Imagery Type,
 - B. Imagery Subtype,
 - C. Format,
 - D. Originating Site,
 - E. Store time, and
 - F. Geographic area.
- 3.2.4.8 MDIMG shall enforce discretionary access control for imagery data and grant application access to the descriptive information and data according to Table 3.2-23. The table identifies privileges by data category and application group.

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Table 3.2-23. MDIMG Access Privileges

Privilege	Level	Decoded Data	Edited Data
Connect to Database	Database	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Insert (Store)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Update (Update)	Table, View	NITES I Data Management Applications	NITES I, II Editing Application
Select (Read)	Table, View	NITES I, II Applications, Approved non-NITES Applications	NITES I, II Applications, Approved non-NITES Applications
Delete (Delete)	Table, View	NITES I Data Management Applications	NITES I, II Editing Applications (owner)
Execute (Execute)	Procedure, Function	NITES I Data Management Applications	NITES I Data Management Applications

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3.2.5 Climatology Data Requirements

The requirements for METOC Database climatology data are currently evolving and will be provided in a later revision of this document.

3.2.6 Data Archive Requirements

3.2.6.1 The METOC Database shall provide capability for archiving data to and retrieving data from off-line storage media. The data being archived or retrieved shall be determined by the operator and shall consist of METOC data and products for specific date(s) and regions to support causality analysis and special briefing needs.

3.2.6.2 An operator accessible index of archived data shall be provided.

3.2.6.3 The data being archived or retrieved shall be determined by the operator and shall consist of METOC data and products for specific date(s) and regions to support causality analysis and special briefing needs.

3.2.6.4 Only operators designated by the system administrator shall be capable of initiating this function.

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3.3 External Interface Requirements

This section describes the external interface requirements for the TESS/NC METOC database.

3.3.1 Interface Identification and Diagram

The METOC Database shall interface with the following CSCIs the TESS(3)/NC system:

1. Filter and Alerts CSCI (FLTALT)
2. Weather Forecasting and Analysis CSCI (WFRANL)
3. Satellite Analysis and Viewer CSCI (SANLVW)
4. NITES I METOC Decision Aids CSCI (NIAPPS)
5. NITES II METOC Decision Aids CSCI (NIIAPPS)
6. METOC DB Maintenance CSCI (MDBMAN)
7. Web Management CSCI (WEBMAN)
8. Office Tools (OFFTLS)
9. Image Processing (IMGPRO)
10. COTS DBMS (DBMS).

Figure 3.3-1 depicts the software interfaces and the data flow relationship between the METOC Database CSCI and the other CSCIs with which it interfaces. Figure 3.3-1 is conceptual in that the METOC Database is part of a distributed client/server system and interfacing CSCIs can reside on the same or different HWCI as the METOC Database. The following paragraphs describe those CSCI interfaces.

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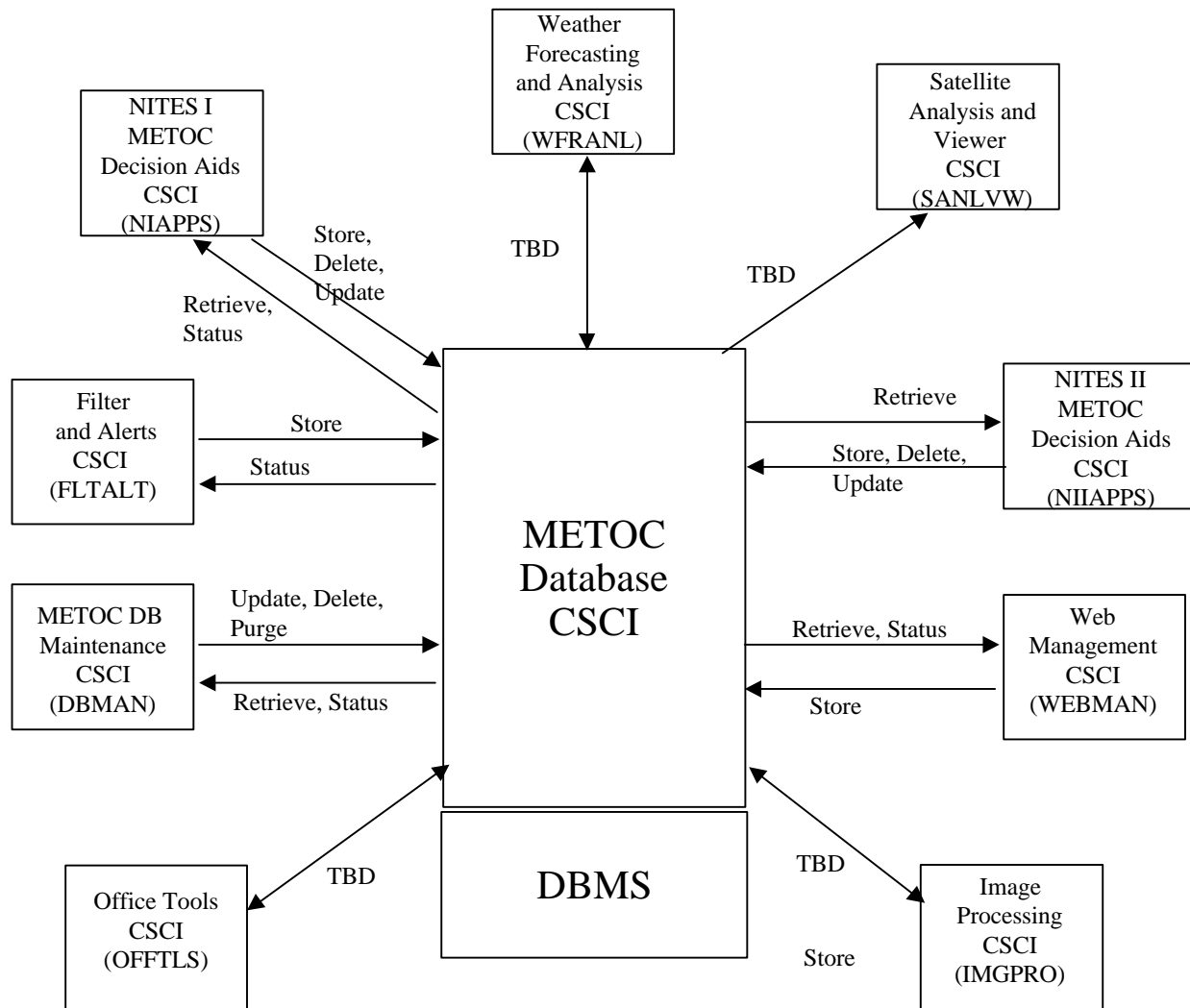


Figure 3.3-1. METOC Database CSCI External Interfaces

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3.3.2 Filter and Alert CSCI (FLTALT)

The METOC Database shall interface with FLTALT to populate the METOC Database segments with METOC data. FLTALT provides software programs that automatically convert external interface provided METOC data to a format compatible with the METOC database. The converted data is filtered and if retained, stored in the applicable METOC Database segment.

3.3.2.1 GRID Data Interface

Description: GRIB formatted Central Site distributed grid field data is converted to database format and stored as descriptive and dataset data in the MDGRID component of the METOC Database.

Type: Asynchronous data transfer and store.

Priority: High.

Protocol: TEDS API or ANSI SQL.

Frequency: Receipt of Central Site GRIB data file.

Transfer Rate: Up to 5000 grids/day

Input: Grid field metadata and element datasets.

Output: Data store operation status.

3.3.2.2 OTH-T Gold Grid Data Interface

Description: OTH-T Gold formatted JMCOMS distributed grid field messages (GRIDFLD) are converted to database format and stored in the MDGRID component of the METOC Database.

Type: Asynchronous data transfer and store.

Priority: High.

Protocol: TEDS API or ANSI SQL.

Frequency: Per Message Receipt.

Transfer Rate: TBD

Input: Grid field metadata and element datasets.

Output: Data store operation status.

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3.3.2.3 BUFR Data Interface

Description: BUFR formatted Central Site distributed observation data message messages are converted to database format and stored in the MDLLT component of the METOC Database.

Type: Asynchronous data transfer and store.

Priority: High.

Protocol: TEDS API or ANSI SQL.

Frequency: Per Message Receipt.

Transfer Rate: Up to 1200 messages/hour.
8kbs.

Input: Observation metadata and element datasets.

Output: Data store operation status.

3.3.2.4 Textual Bulletin Observation Data Interface

Description: WMO formatted textual (BAUDOT) observation data messages distributed via AWN MEDS, RATT, FMC, HSFb, and SMOOS interfaces. Messages are converted to database format and stored in the MDTXT component of the METOC Database.

Type: Asynchronous data transfer and store.

Priority: High.

Protocol: TEDS API or ANSI SQL.

Frequency: Per message receipt.

Transfer Rate: Upto1200 messages/hour.
8KB/second.

Input: Observation metadata and element datasets.

Output: Data store operation status.

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3.3.3 Weather Forecasting and Analysis CSCI (WFRANL)

The METOC Database shall interface with WFRANL and provide grid field and observation data to support weather analysis and forecast product generation. The METOC Database shall also support storing the products for later recall and distribution. Note: The METOC Database to WFRANL interface is dependent on the selection of the WFRANL COTS package for TESS(3)/NC.

3.3.4 Satellite Analysis and Viewer CSCI (SANLVW)

The METOC Database shall interface with SANLVW and support the storing of SANLVW generated satellite products to the METOC Database. The METOC Database shall also support the later recall and distribution of those products. Note: The METOC Database to SANLVW interface is dependent on the selection of the SANLVW COTS package for TESS(3)/NC.

3.3.5 NITES I METOC Decision Aids CSCI (NIAPPS)

The METOC Database shall interface with NITES I METOC Decision Aid applications. This interface shall provide METOC data and products to NIAPPS through data retrieve, store, update, and delete operations. This interface shall support those operations in a networked environment where NIAPPS reside on local and networked platforms. Other than network traffic influences (e.g., response time), the interfaces shall be consistent regardless of the application location. Data operation status information shall also be part of the interface.

3.3.6 NITES II METOC Decision Aids CSCI (NIIAPPS)

The METOC Database shall interface with NITES II METOC and Tactical Decision Aid applications. This interface shall provide METOC data and products to NIIAPPS through data retrieve, store, update, and delete operations. This interface supports those operations in a networked environment where NIAPPS reside on local and networked platforms. Other than network traffic

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influences (e.g., response time), the interfaces shall be consistent regardless of the application location. Data operation status information shall also be part of the interface.

3.3.7 METOC DB Maintenance CSCI (MDBMAN)

The METOC Database shall interface with MDBMAN. MDBMAN supports the database maintenance functions of manually and automatically purging (deleting) expired or out of date data from the database. Additionally, MDBMAN supports the archival and restore of METOC data to and from external media (e.g., tape). This interface supports these functions using DBMS select, insert, update, and update operations in an environment where MDBMAN can reside on local and networked platforms. Other than network traffic influences (e.g., response time), the interfaces shall be consistent regardless of the application location. Data operation status information shall also be part of the interface.

3.3.8 Web Management CSCI (WEBMAN)

The METOC Database shall interface with WEBMAN. WEBMAN supports the data distribution functions for the TESS(3)/NC system. It extracts METOC Database products from the database using DBMS select operations and distributes those products using the http protocol.

3.3.9 Office Tools (OFFTLS)

The METOC Database shall interface with OFFTLS and support the storing and retrieval of OFFTL products to the database. This interface supports these functions using DBMS select, insert, and update operations in an environment where MDBMAN can reside on local and networked platforms. The data transferred shall be in the native format of the specific OFFTLS application (e.g., PowerPoint .ppt).

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3.3.10 Image Processing (IMGPRO)

The METOC Database shall interface with IMGPRO and support the storing of NITF formatted imagery. This interfaces supports these functions using DBMS insert and update operations in an environment where MDBMAN can reside on local and networked platforms.

3.3.11 COTS DBMS (DBMS)

The METOC Database shall interface with DBMS. DBMS is a commercial-off-the-shelf, DII COE supplied, data base management system that supplies insert, update, select, delete, and data management services (e.g., integrity checks). DBMS also supplies the client/server networking facility that support the METOC Database interfaces described above.

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3.4 METOC Database Internal Interface Requirements

The internal interface requirements are left to the design.

3.5 METOC Database Internal Data Requirements

The internal interface requirements are left to the design.

3.6 Adaptation Requirements

TBD.

3.7 Safety Requirements

There are no safety requirements specifically related to the TESS(3)/NC METOC Database. All safety requirements pertinent to any CSCI of the TESS(3)/NC apply.

3.8 Security and Privacy Requirements

The TESS(3)/NC METOC Database shall conform to the security and privacy requirements established for TESS(3)/NC.

3.9 Environment Requirements

As part of TESS(3)/NC, the METOC Database is required to operate in a variety of hardware and software environments. Consult the Performance Specification for TESS(3)/NC for more details.

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3.10 Computer Resource Requirements

3.10.1 Computer Hardware Requirements

The METOC Database shall run on any hardware specified for TESS(3)/NC.

3.10.2 Computer Hardware Resource Utilization Requirements

TBD.

3.10.3 Computer Software Requirements

See TESS(3)/NC System/Sub-System Design Document (SSDD).

3.10.4 Computer Communications Requirements

See TESS(3)/NC System/Sub-System Design Document (SSDD).

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3.11 Software Quality Factors

TBD.

3.12 Design and Implementation Constraints

The TESS(3)/NC METOC Database shall adhere to current DII/COE specifications for packaging and integration of the software.

3.13 Personnel-Related Requirements

There are no personnel-related requirements for the TESS(3)/NC METOC Database as it has no user interface, only APIs for use by application developers.

3.14 Training-Related Requirements

There are no training-related requirements for the TESS(3)/NC METOC Database as it has no user interface, only APIs for use by application developers.

3.15 Logistics-Related Requirements

3.16 Other Requirements

3.17 Packaging requirements

There are no packaging requirements related to the TESS(3)/NC METOC Database.

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3.18 Precedence and Criticality of Requirements

The requirements stated herein stem from requirements stated in the TESS(3)/NC Performance Specification, specifically those in Sections 3.3.2.1, 3.3.3, and 3.4.1, that relate to storage and retrieval of METOC data. In the event of conflict, the requirements stated in the TESS(3)/NC Performance Specification take precedence over the requirements stated herein.

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4 QUALIFICATION PROVISIONS

4.1 Qualification Methods

The following qualification methods shall be used to ensure that each of the requirements of the Weather Watch software has been satisfied:

Demonstration. Demonstration is a qualification method that is carried out by operation and relies on observable functional operation not requiring the use of elaborate instrumentation or special test equipment.

Analysis. Analysis is a qualification method that relies on the processing of accumulated data obtained from other qualifications.

Inspection. Inspection is a qualification method that is carried out by visual examination of the code and documentation.

4.1.1 Computer Software Test and Evaluation

Informal and formal Computer Software Test and Evaluation shall be performed to support the design and development of the software. The informal testing is defined in the next subparagraph. The formal testing is described in paragraph 4.1.3. The testing shall include evaluation of the following requirements:

The capability of the TESS(3)/NC METOC Database software to ingest and retrieve Grid Field Data as specified in Section 3.2.

The capability of the TESS(3)/NC METOC Database software to ingest and retrieve observation/profile data as specified in Section 3.2.

Table 4.1-1 shows the allocation of testing methods to the requirements above.

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Table 4.1-1. Qualification Cross-Reference Table

Requirement Name	Qualification	
	Method(s)	Level
Ingest/retrieve Grid Field Data	A, D, I	1
Ingest/retrieve observation data	A, D, I	1
Satisfy all other requirements of Section 3.2	A, D, I	1

4.1.2 Preliminary Qualification Testing

Each module shall be tested in a standalone fashion before being integrated with other modules, where possible. The integrated software shall be tested informally according to the test procedures and steps in the Software Test Description document with no errors or redlines to the test documentation before formal testing can occur.

4.1.3 Formal Qualification Testing

Formal qualification tests shall be performed on the target hardware to demonstrate compliance with all of the requirements specified in this document. The software shall be placed under configuration control at this time, and testing shall be performed by an independent testing group.

4.2 Special Qualification Requirements

No special tools, techniques, procedures, or facilities are required for qualification testing of the TESS(3)/NC METOC Database software.

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5 REQUIREMENTS TRACEABILITY

The following matrix provides the METOC Database CSCI software requirements paragraph(s) satisfying the System Performance Specification requirement.

PS Requirement Paragraph No.	Performance Specification Requirement	SRS Requirement Paragraph No.
3.3.2	The data management component shall make METOC data and products available to NITES I and NITES II applications, as well as non-TESS(3)/NC systems requiring METOC data.	3.2.1.1.5
3.3.2.1	The data management component shall provide DII COE compliant database segments that will serve as the repository of METOC data and products.	3.2.1.1.1
3.3.2.1	The [METOC] database shall support data access in a heterogeneous networked computing environment.	3.2.1.1.5
3.3.2.1.1	The METOC database shall make METOC Data available for distribution to other NITES I and NITES II systems.	3.2.1.1.5
3.3.2.1.2	METOC database capacities shall take into account descriptive and associated metadata storage requirements.	3.2.1.2.2
3.3.2.1.2	METOC Database shall have the capacity to store the following METOC data and products for real-time retrieval in less than one minute: [grids, observations, images].	3.2.2.16.2
3.3.2.1.2.1	The METOC database shall store a minimum of 10000 grids.	3.2.2.3
3.3.2.1.2.2	The METOC database shall store a minimum of 50000 observations.	3.2.2.4

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3.3.2.1.2.3	The METOC database shall store a minimum of 350 images.	3.2.4
3.3.3.3	The data management component shall provide data store operations to the METOC database.	3.2.1.2
3.3.3.3	NITES I and II data storage system shall be scaleable in size to efficiently support the range of requirements of these installations	3.2.1.2.1
3.3.3.3	The [data storage] interface shall appear consistent to client applications.	3.2.1.3.2
3.3.3.3.1.1	The data management component shall support storing of METOC data to the METOC database.	3.2.1.2
3.3.3.3.1.2	The data management component [METOC Database] shall store data at its full resolution, original projection, and without loss of information.	3.2.1.2.3
3.3.3.3.1.3	The data management component [METOC Database] shall support multi-user storing of METOC data to the database without corruption.	3.2.1.2.4
3.3.3.3.1.4	The data management component shall store and update descriptive information (metadata) for all METOC data and products stored in the METOC database.	3.2.1.3.3
3.3.3.3.2	The data management component [METOC Database] shall support automated and/or operator initiated updates of data tables supporting the METOC database.	3.2.1.3.12
3.3.3.3.2	Only operators designated by the system administrator shall be capable of initiating this function.	3.2.1.3.12

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6 NOTES

6.1 Glossary of Acronyms

AESS	Allied Environmental Support System
AN/SMQ-11	Meteorological Data Receiver Recorder Set
ANSI	American National Standards Institute
APE	Application Programming Interface
BT	Bathythermograph
BUFR	Binary Universal Form for the Representation of Meteorological Data
C ⁴ I	Command, Control, Communications, Computer, and Intelligence
CNMOC	Commander, Naval Meteorology and Oceanography Command
CNO	Chief of Naval Operations
COE	Common Operating Environment
CORBA	Common Object Request Broker Architecture
COTS	Commercial Off-the-Shelf
CPU	Central Processing Unit
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
DBA	Database Administrator
DBDD	Database Design Description
DBMS	Database Management System
DDDS	Defense Data Dictionary System
DDM	DoD Data Model

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DEF	Data Exchange Format
DID	Data Item Description
DII	Defense Information Infrastructure
DMSP	Defense Meteorological Satellite Program
DoD	Department of Defense
FNMOCC	Fleet Numerical Meteorology and Oceanography Center
GCCS	Global Command and Control System
GOTS	Government-Off-the-Shelf
GRIB	Gridded Binary
I&RTS	Integration and Run Time Specification
IC4ISR	Integrated C ⁴ I Interoperability Support Requirements
IDD	Interface Design Document
IMOSS	Interim Mobile Oceanographic Support System
JMCIS	Joint Maritime Command Information System
JMCOMS	Joint Maritime Communications Systems
JMS	Joint METOC Segment
JTA	Joint Tactical Architecture
LAN	Local Area Network
METOC	Meteorology and Oceanography
MIDDS	Meteorological Integrated Data Display System
NITES	Navy Integrated Tactical Environmental Subsystem
NRaD	NCCOSC Research, Development, Test, and Evaluation Division
NRL	Naval Research Laboratory
OAML	Oceanographic and Atmospheric Master Library
RDBMS	Relational Database Management System

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SPAWAR	Space and Naval Warfare Systems Command
TEDS	Tactical Environmental Data System
TESS(3)	Tactical Environmental Support System
TESS(3)/NC	Tactical Environmental Support System/Next Century
WAN	Wide Area Network

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6.2 Definitions

The METOC Database maintains category information about the data and products available in the METOC Database (see Table 3.2.1.3.4-1 Data Category). The following definitions apply to the categories:

- | | |
|--------------|---|
| Base data | Base data is defined as data received by the system either directly from Central sites through the local data ingest and decode components. Base data retains the full fidelity and resolution of the generating source. Quality control of base data is limited to replacement of missing data values with the missing data value indicator. |
| Edited data | Edited data is defined as base or previously edited data intentionally modified by the operator through a data editing applications or an event/scheduled driven application. Base data records that have been edited shall be marked as edited when stored back to the METOC database and provide that indication when retrieved. Re-edited data retains the edited category. Edited data includes operator originated data created by the operator through data create or editing applications. |
| Derived data | Derived data is defined to be base or edited data computationally changed or combined with other base or edited types to form a new dataset. Derived datasets and records shall be marked as derived when stored back to the METOC database and provide that indication when retrieved. Derived data is a specialized category of data currently applied to outputs from local grid field reanalysis model applications such as MVOI and COAMPS. |
| Product data | Product data is defined to be analysis or decision aid application output in standard display formats. These formats include: JPEG (JTA mandated), NITFS (JTA mandated), MIF, GIF, JPEG, XWD, XBM and are stored in the METOC database for later display or distribution. |

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APPENDIX A - METOC OBSERVATION DATA ELEMENTS

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
(BUFR)	Airframe icing	X										Integer	Range	N/A	0 - 15 (Table 0-20-041)	N/A	1 byte	Severity of icing	33588
(BUFR)	Turbulence, degree	X										Integer	Range	N/A	0 - 16 (Table 0-11-031)	N/A	1 byte	Intensity of turbulence	33597
(BUFR)	Turbulence, top	X										Integer	Range	meters	0 - 9999	N/A	2 bytes	Height of top of turbulence	33602
(BUFR)	Density, at Altitude						X					Integer	Range	g/m3	.000001 to 1.000000	N/A	4 bytes	Density rounded to third significant figure (if a temperature value exists)	33235
(BUFR)	Time indicator						X					Byte	Enum	N/A	See BUFR table 0-08-017	N/A	1 byte	A time descriptor given by 'TT' (to), 'FF' (from), 'TL' (until), etc.	NE
(BUFR)	Vertical sounding significance, at Altitude						X					Byte	Range	Range	Flag Table (BUFR table 0-08-001)	N/A	1 byte	Indicator of significant levels (e.g., surface, standard, maximum, etc)	NE
A	Mirage							X (supp)				Byte	Enum	N/A	0 - 8 (Code Table 0101)	N/A	1 byte	Code for type of mirage	NE
a	Pressure tendency characteristic			X				X				Byte	Enum	N/A	0 - 8 (Code Table 0200)	N/A	4 bytes	amount of pressure tendency during the three hours leading to observation	18567
A ₁	WMO Regional Area ID		X	X				X				Byte	Enum	N/A	See Code Table 0161	N/A	1 byte	WMO specified geographic area	13691

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
a ₁	Ground equipment type						X					Byte	Enum	N/A	See Code Table 0262	N/A	1 byte	Reason for no report, or code for ground equipment employed	37170
A ₃	Day Darkness, Worst							X (supp)				Byte	Enum	N/A	0 - 2 (Code Table 0163)	N/A	1 byte	Code for darkness of day	NE
a ₃	Height Geopotential							X				Integer	Scalar	gpm	0-10000	N/A	4 bytes	Geopotential height at given (hPa) surfaces	29738
a ₄	Type, Measuring Equipment										X	Byte	Enum	N/A	0 - 9 (Code Table 0265)	N/A	1 byte	Wind-measuring instrument	18883
a _c	Change in Character					X						Char	Enum	N/A	0 - 9, / (Code Table 0204)	N/A	1 byte	Description of change in shape & visibility of tropical cyclone's center in 30 min preceding observation	33590
A _C	Position, Accuracy of					X						Char	ASCII	N/A	1 - 7, / (Code Table 0104)	N/A	1 byte	Description of accuracy of location of tropical cyclone's center	43676
a _e	Echo Pattern, Tendency of					X						Char	ASCII	N/A	1 - 9, / (Code Table 0235)	N/A	1 byte	Change in intensity and coverage of echo, expressed as increasing / decreasing / no appreciable change	33596
B	Direction of Longitude								X			Char	ASCII	N/A	N/A	N/A	1 byte	E' = east, 'W' = west	18685
B _A	Level, Turbulence, Forecast	X										Byte	Enum	N/A	0 - 3 (Code Table 0302)	N/A	1 byte	Characterized as none to severe	33600
b _i	Land Origin, Ice of							X				Char	Enum	N/A	0 - 9, / (Code Table 0439)	N/A	1 byte	Amount of land origin ice	34513
b _w	WMO Sub Area		X	X				X(sh)				Byte	Enum	N/A	See Code Table 0161	N/A	1 byte	Sub-region in WMO area above	13691

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
C	Cloud Genus							X				Char	ASCII	N/A	0 - 9, / (Code Table 0500)	N/A	1 byte	1 of 10 general cloud types in layer indicated by "Base height"	29462
C	Cloud Genus, Moving							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0500)	N/A	1 byte	Code for 1 of 10 general cloud types	29462
C	Cloud Genus, Evolving							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0500)	N/A	1 byte	Code for 1 of 10 general cloud types	29462
C	Cloud Genus of Max Concentration							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0500)	N/A	1 byte	Code for 1 of 10 general cloud types	29462
C	Cloud Elevation Genus							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0500)	N/A	1 byte	1 of 10 general cloud types	29462
C _(0:n) C _(0:n) C _(0:n)	Speed, current, At Depth		X	X								Float	Range	cm/second	-10.0 - 10.0	10-1	4 bytes	Speed of current at selected depth	18581
C ₂ C ₂	Conditions, Probability of forecast								X			Byte	Enum	%	30, 40, 50	N/A	1 byte	Chance of occurrence of alternate values of forecast elements during forecast period. Placed immediately before each alternate value having probability 30, 40, or 50 or prefixed by TEMPO. Not given if < 30.	NE
C _a	Clouds, Vertical Development							X (supp)				Byte	Enum	N/A	0 - 7 (Code Table 0531)	N/A	1 byte	Isolated/numerous	NE
C _c	Clouds, Coloration of							X (supp)				Byte	Enum	N/A	1 - 8 (Code Table 0533)	N/A	1 byte	Code for coloration and/or convergence of clouds associated with a tropical disturbance	NE

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
C _H	Type, Cloud, High, Forecast				X							Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29428
C _H	Type, Cloud, High				X			X	X	X		Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29428
c _I	Concentration, Ice								X			Byte	Range	percent	000 - 100	N/A	1 byte	Surface coverage of ice	34503
C _L	Type, Cloud, Low, Forecast				X							Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29410
C _L	Cloud, Low, Direction of Max Concentration							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction of maximum low cloud concentration	29410
C _L	Type, Cloud, Low				X			X	X	X		Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29410
C _L	Clouds, anvil or Cumulonimbus							X (supp)				Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29410
C _M	Type, Cloud, Mid, Forecast				X							Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29425
C _M	Type, Cloud, Mid				X			X	X	X		Byte	Enum	N/A	See BUFR code table 0-08-012	N/A	1 byte	Type of cloud in layer being forecast	29425
C _o	Clouds, Orographic							X (supp)				Byte	Enum	N/A	1 - 9 (Code Table 0561)	N/A	1 byte	Type of cloud, forming/unchanging/dissolving	NE
C _s	Clouds, Special							X (supp)				Byte	Enum	N/A	1 - 5 (Code Table 0521)	N/A	1 byte	Code for type of special cloud	NE

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
c _T	Correction type, Thermodynamic						X					Byte	Enum	N/A	See Code Table 0659	N/A	1 byte	Thermodynamic correction technique	NE
c _w	Correction type, Wind						X					Byte	Enum	N/A	See Code Table 0659	N/A	1 byte	Wind correction technique	NE
CCCC	Call Sign, ICAO	X			X				X			Char	String	N/A	N/A	N/A	8 bytes	International Civil Aviation Organization aerodrome location indicator	20495
d _(0:n) d _(0:n)	Direction, current, At Depth		X									Float	Range	degrees true	0.0 - 359.0	10-1	2 bytes	True direction towards which current is drifting	18580
D _(0:n) D _(0:n)	Dew Point Depression, Standard Isobaric Levels									X	X	Float	Range	degrees Celsius	00.0 - 490.0	10-1	4 bytes	Difference between wet- bulb and dry-bulb temperatures	NE
d _(0:n) d _(0:n)	Direction, Wind, Significant Isobaric Levels									X	X	Integer	Range	(degrees + 5) / 10	0 - 36	N/A	1 byte	Direction of wind	33671
D _(0:n) D _(0:n)	Dew Point Depression, Significant Isobaric Levels									X	X	Float	Range	degrees Celsius	00.0 - 490.0	10-1	4 bytes	Difference between wet- bulb and dry-bulb temperatures	NE
d _(0:n) d _(0:n)	Direction, Wind, Standard Isobaric Levels									X	X	Integer	Range	(degrees + 5) / 10	0 - 36	N/A	1 byte	Direction of wind	33671
d _(1:n) d _(1:n)	Direction, Wind, At Geopotential						X					Integer	Range	(Degrees + 5) / 10	0 - 36	N/A	1 byte	Direction of wind	33671
d _(1:n) d _(1:n)	Direction, Wind, Standard Isobaric Levels						X					Integer	Range	degrees true	See Code Table 0877 or 0878	N/A	1 byte	Current wind direction at this level	33671

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
D _a	Direction of Max Concentration of Phenomenon Reported							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction of Phenomenon or Present Weather, Additional, Present							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction of Phenomenon or Present Weather, Additional, Past							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction of Phenomenon or Present Weather, Past							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Location of Phenomenon, Supplementary							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction of Phenomenon Reported, Amplification							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction of Phenomenon Reported, Present							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Direction in Variation in Visibility over Past Hour							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _a	Clouds, Location of Vertical Development							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
D _a	Clouds, Location of Colored							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phe- nomenon is coming	42270
D _a	Clouds, Low, Location of Max Concentration							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phe- nomenon is coming	42270
D _a	Clouds, Direction from which seen							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phe- nomenon is coming	42270
D _a	Mirage, Direction from which seen							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which mirage is seen	42270
D _a	Day Darkness, Direction of Worst							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which worst day dark- ness is seen	42270
D _a	Clouds, Orographic, Direction of							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which orographic clouds are seen	42270
D _a	Clouds, Location of Max Concentration, Higher-Level Station							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed clouds of maximum concentration are seen	42270
D _a	Clouds, Direction of Vertical De- velopment							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed clouds of vertical development are seen	42270
D _a	Rain Direction at Station not Associated with Thunderstorm							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction for rain, not associated with thunderstorm	42270

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
D _a	Snow Direction at Station not Associated with Thunderstorm							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction for snow, not associated with thunderstorm	42270
D _a	Shower Direction at Station not Associated with Thunderstorm							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction for shower, not associated with thunderstorm	42270
D _a	Vortex, Approach Direction of							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction of approach of a vortex	42270
d _B d _B	Direction, drift		X									Float	Range	degree true	0.0 - 359.9	10-1	2 bytes	Direction if buoy is drifting type	NE
d _c	Duration and Character of Precipitation							X				Byte	Enum	N/A	0 - 7, 9 (Code Table 0833)	N/A	1 byte	0 - 3 indicates 1 continuous precip. period, 4 -7 indicates 2 or more periods	29617
d _c	Duration and Character of Precipitation, Supplementary							X (supp)				Byte	Enum	N/A	0 - 7, 9 (Code Table 0833)	N/A	1 byte	0 - 3 indicates 1 continuous precip. period, 4 -7 indicates 2 or more periods, supplementary	29617
D _c D _c	Surface Current Direction		X									Integer	Range	tens of degrees	0 - 35	N/A	2 bytes	Direction of current at sea-surface	18580
D _e	Direction, Echo Pattern					X						Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction towards which echo is moving	33666
D _L	Clouds, Low, Direction of Movement							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which low clouds are moving	42270
d _m d _m	Direction, Wind At Maximum Wind Level									X	X	Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction from which strongest wind blows	33674

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
d _n d _n d _n	Direction, Counter-Clockwise Wind variation				X							Integer	Range	degrees true	0 - 3590	N/A	2 bytes	Extreme clockwise wind direction of variable wind	NE
D _p	Phenomenon, Approach Direction of, Present							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _p	Phenomenon, Approach Direction of, Past							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming	42270
D _p	Phenomenon, Approach Direction of, Additional Present							X (supp)				Char	ASCII	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction from which observed phenomenon is coming, additional present	42270
D _p	Phenomenon, Forward Direction of, Present							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed, present	42270
D _p	Phenomenon, Forward Direction of, Past							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed, past	42270
D _p	Phenomenon, Forward movement Direction of, Additional Present							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed, additional present	42270
D _p	Squall, Approach Direction of							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction of approach of a squall	42270
D _p	Clouds, Approach Direction of							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction of approach of clouds	42270

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
D _p	Clouds, Low, Approach Direction of							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction of approach of low clouds	42270
D _r D _r	Runway, Number				X							Integer	Range	N/A	0 - 255	N/A	1 byte	Number of current runway	45016
D _s	Direction, Ship							X(sh)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Direction defined as NE, E, SE, ..., N	42270
d _s d _s	Direction, System or Front, Moving					X						Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction towards which tropical cyclone is moving	32933
D _t D _t	Depression, Dew point, Tropopause Level									X(tropo)		Float	Range	degrees Celsius	00.0 - 490.0	10-1	4 bytes	Difference between wet-bulb and dry-bulb temperatures at the tropopause	NE
d _t d _t	Direction, Wind, Tropopause Level									X(tropo)		Integer	Range	(Degrees + 5) / 10	0 - 36	N/A	1 byte	Direction of wind at the tropopause	* 29574
D _v	Direction, Maximum Horizontal Visibility				X							Integer	Range	degrees true	0 - 350	N/A	2 bytes	Direction of observation	* 42270
d _{w1} d _{w1}	Direction, Swell Wave, Primary							X				Integer	Range	Degrees	1 - 359	N/A	2 bytes	Direction from which primary swell approaches station	19575
d _{w2} d _{w2}	Direction, Swell Wave, Secondary							X				Integer	Range	Degrees	1 - 359	N/A	2 bytes	Direction from which secondary swell approaches station	19573
d _x d _x d _x	Direction, Clockwise Wind variation				X							Integer	Range	degrees true	0 - 3590	N/A	2 bytes	Clockwise wind direction of variable wind	

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
D....D	Call Sign, Ship			X	X			X(sh/mob)		X	X	String	ASCII	N/A	Alphanumeric character string	N/A	8 bytes	Ship's international call sign; given for sea stations only	15110
dd	Direction, Wind	X	X		X	X	X		X	X	X	Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction from which wind is coming, at aircraft's location	29574
dd	Direction, Squall							X (supp)				Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction in which squall is moving.	29574
dd	Direction, Wind At Maximum Wind Level							X (supp)				Integer	Range	Degrees	001 - 360	N/A	2 bytes	Direction of maximum wind	29574
ddd	Direction, Wind			X					X			Integer	Range	tens of degrees	0 - 3500	N/A	1 byte	current wind direction at location	29574
E	State of Ground without Ice or snow							X(sfc/mob)				Byte	Enum	N/A	0 - 9 (Code Table 0901)	N/A	1 byte	Ground described as dry, moist, wet, etc.	* 29756
e'	Elevation of Clouds, Angle Above Horizon							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 1004)	N/A	1 byte	Angle relative to observer	* 29408
E'	State of Ground with Ice or Snow							X(sfc/mob)				Byte	Enum	N/A	0 - 9 (Code Table 0975)	N/A	1 byte	Description of snow/ice cover	* 29756
E _h	Clouds, Low, Elevation Above Horizon							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 1004)	N/A	1 byte	Angle of low clouds, relative to observer	NE
E _h	Phenomenon, Elevation of Max Concentration of							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation above the horizon of phenomenon reported	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
E _h	Direction From which phenome- non reported in present conditions Approaching							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation above the horizon of phenome- non reported in present weather conditions	NE
E _h	Elevation of max Concentration of phenomenon reported in amplification of Additional Present weather							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation above the horizon of phenome- non reported in present weather conditions, additional	NE
E _h	Elevation of Max Concentration of phenomenon reported in Additional Present weather							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation above the horizon of phenome- non reported in present weather conditions, additional	NE
E _h	Elevation of Max Concentration of phenomenon reported in Additional Past weather							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation of maximum concentration of phenomenon	NE
E _h	Elevation of Max Concentration of phenomenon reported in Additional Past weather 2							X (supp)				Byte	Enum	N/A	1, 3, 7 (Code Table 0938)	N/A	1 byte	Code for elevation of maximum concentration of phenomenon, Addi- tional Past weather 2	NE
E _h	Elevation of Phenomenon, Supplementary							X (supp)				Byte	Enum	N/A	70 - 99 (Code Table 4077)	N/A	1 byte	Word description of supplementary phenomenon	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
E _h	Elevation of Phenomenon, Supplementary, Common to Fixed Surface, Ship and Mobile Surface Synoptic Reports							X (supp)				Byte	Enum	N/A	70 - 99 (Code Table 4077)	N/A	1 byte	Word description of supplementary phenomenon common to Fixed Surface, Ship and Mobile Surface Synoptic Reports	NE
E _h	Mirage, Elevation of observed							X (supp)				Byte	Enum	N/A	70 - 99 (Code Table 4077)	N/A	1 byte	Elevation of observed mirage	NE
E _h	Thickness, Ice Accretion							X				Integer	Range	centimeters	0001 - 9999	N/A	2 bytes	Thickness of main form of ice, excluding snow	* 34501
e _T e _T	Sensor type, Thermodynamic										X	Byte	Enum	N/A	See Code Table 1085	N/A	1 byte	Type of thermodynamic sensing equipment	* 18883
e _w e _w	Sensor type, Wind										X	Byte	Enum	N/A	See Code Table 1095	N/A	1 byte	Type of wind sensing equipment	* 18883
f ₀ f ₀ f ₀	Speed, Wind, Station Level									X(sfc)		Integer	Range	Determined by Wind Speed Units	0 -300	N/A	2 bytes	Speed of wind	29577
f _(0:n) f _(0:n) f _(0:n)	Speed, Wind, at Given Sig level									X	X	Integer	Range	Determined by Wind Speed Units	0 -300	N/A	2 bytes	Speed of the wind at this level	29577
f _(0:n) f _(0:n) f _(0:n)	Speed, Wind, at Given Std level									X	X	Integer	Range	Determined by Wind Speed Units	0 -300	N/A	2 bytes	Speed of the wind at this level	29577

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
f _(1:n) f _(1:n) f _(1:n)	Speed, Wind, at Altitude						X					Integer	Range	Deter- mined by Wind Speed Units	0 -300	N/A	2 bytes	Speed of wind at given pressure altitude	29577
f _(1:n) f _(1:n) f _(1:n)	Speed, Wind, At Geopotential						X					Integer	Range	Deter- mined by Wind Speed Units	0 -300	N/A	2 bytes	Speed of wind at given geopotential height	29577
f _e	Speed, Echo Pattern					X						Char	ASCII	N/A	0 - 9, / (Code Table 1236)	N/A	1 byte	Forward speed of echo pattern, expressed in ranges from 0 - 9 km/h to >= 90 km/h	NE
f _m f _m	Gusts, Wind, Max				X			X				Integer	Range	m s-1	0 - 300	N/A	2 bytes	speed of maximum wind gusts	29413
f _m f _m f _m	Speed, Wind, At Maximum Wind Level									X	X	Fixed- point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Speed at which strongest wind blows	33681
f _s f _s	Speed, System or Front, of					X						Byte	Range	m/s	00 - 99	N/A	1 byte	Forward speed at which tropical cyclone is moving	NE
f _f f _f	Speed, Wind, Tropopause Level									X (tropo)		Integer	Range	Deter- mined by Wind Speed Units	0 -100	N/A	2 bytes	speed of wind at tropopause	NE
F _x	Wind Force, Maximum							X (supp)				Byte	Enum	N/A	0 - 12	N/A	1 byte	Wind speed measured on Beaufort scale	NE
ff	Wind Gust, Highest							X (supp)				Fixed- point	Range	m/s	5.0 - 200.0	10-1	4 bytes	Maximum peak-lull spread in past-weather report period	* 29712

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
ff	Wind Gusts, Highest previous 10 minutes prior to report							X (supp)				Fixed- point	Range	m/s	5.0 - 200.0	10-1	4 bytes	Maximum peak-lull spread in preceding 10 min.	* 29413
ff	Wind Mean Speed of Squall							X (supp)				Fixed- point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Over entire past-weather report period. (If high, sustained wind occurs after a sudden speed increase, this field is reported twice, before & after the change)	* 45037
ff	Wind Speed, Highest Mean of Squall							X (supp)				Fixed- point	Range	m/s	5.0 - 200.0	10-1	4 bytes	Maximum peak-lull spread in past-weather report period	* 33681
ff	Wind Speed, Lowest mean of Squall							X (supp)				Fixed- point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Over all 10-min. periods in past-weather report period	* 33677
ff fff	Speed, Wind	X	X	X	X	X		X	X			Fixed- point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Speed at which wind is blowing, at aircraft's location	29577
G _F G _F	Changes, Temporary, Valid Time, Begin								X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast begins	45142
G _F G _F	Changes, Temporary, Valid Time, End								X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast ends	
G _F G _F	Conditions, Valid Time, Begin								X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast begins	45142
G _F G _F	Conditions, Valid Time, End								X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast ends	45138
GGgg	Time, Effective				X				X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which temperature prediction is valid	* 18549

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
GGgg	Time, Valid, Begin				X				X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast begins	45142
GGgg	Time, Valid, End				X				X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast ends	45138
GGgg	Time, of Observation						X					Integer	Range	seconds since 1970	0 - 232-1	N/A	4 bytes	Time of observation	* 18549
GGgg	Time, of Radiosonde launch									X (Sig Lvl)		Integer	Scalar	seconds since 1 Jan 1970	0 - 232-1	N/A	4 bytes	Time of radiosonde launch	* 18549
GGggZ	Time, of Observation	X		X	X	X		X			X	Integer	Range	seconds since 1970	0 - 232-1	N/A	4 bytes	Time of observation	* 18549
GGggZ	Time, of Issuance								X			Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Time at which forecast was made	* 18549
GGggZ	Time, of Report									X		Long	Range	Seconds since 1970	0-232	N/A	4 bytes	Referenced to Jan. 1, 1970	* 18549
h	Height, Cloud Base							X		X		Integer	Range	meters	00000 - 35000	N/A	2 bytes	Height relative to mean sea level of lowest cloud seen	29461
h _(1:n) h _(1:n) h _(1:n)	Geopotential, at Specified Levels						X			X(std)		Integer	Scalar	gpm	0-10000	N/A	4 bytes	Geopotential height at given level	29754
h _B h _B h _B	Height, Turbulence, Lowest Level Of									X		Byte	Enum	N/A	0, 2, 4, 6 (Code Table 3738)	N/A	1 byte	Observed/estimated height of turbulence	* 33600
h _d h _d h _d	level, flight	X										Integer	Range	m	00000 - 99999	N/A	3 bytes	Pressure altitude reported from ACARS system	* 33616
H _e	Echo Top Altitude					X						Char	ASCII	N/A	0 - 9, / (Code Table 1535)	N/A	1 byte	Height above ground of echo, expressed in ranges from 0 - 2 km to >= 18 km	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
h _g h _g	deposit, Height above ground at which diameter is observed							X (supp)				Integer	Range	m	0 - 10000	N/A	2 bytes	Height of station for above observations	29596
h _i h _i h _i	Pressure Altitude	X										Integer	Range	100s of ft.	-1010	N/A	2 bytes	Measure of height relative to 1013.2 hPa	* 14469
h _i h _i h _i	Level, Icing, Lowest									X		Integer	Range	m	-50400	N/A	2 bytes	Lowest level at which icing may occur on aircraft	36407
H _m H _m H _m H _m	Wind Level , Altitude of Maximum										X	Integer	Range	m	5000 - 20000	N/A	2 bytes	Height above sea level of strongest wind	* 33251
h _o h _o h _o h _o	Elevation								X (mob)			Integer	Range	meters or feet	-100998	N/A	1 byte	Height of elevation as given by units specified by elevation indicator	* 29416
h _o h _o h _o h _o	Elevation									X(m)	X(m)	Integer	Range	meters or feet	-100998	N/A	1 byte	Height of elevation as given by units specified by elevation indicator	* 29416
h _s h _s	Height, Cloud Genus							X				Integer	Range	m	00000 - 35000	N/A	2 bytes	Height of base of cloud genus indicated	* 34545
h _s h _s h _s	Height, base cloud				X				X			Integer	Range	meters / 10	0 - 2000	N/A	2 bytes	Height of base of cloud that is below station level	29461
h _s h _s h _s	Height, Cloud Mass, Current High				X				X			Integer	Range	m	00000 - 35000	N/A	2 bytes	Current height of base of high clouds, in 30 meter increments	29461
h _s h _s h _s	Height, Cloud Mass, Current Low				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Current height of base of low clouds, in 30 meter increments	29461
h _s h _s h _s	Height, Cloud Mass, Current Mid				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Current height of base of mid clouds, in 30 meter increments	29461

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
h _s h _s h _s	Height, Cloud Mass, High, Forecast				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Forecast height of base of high clouds in 30 meter increments	29461
h _s h _s h _s	Height, Cloud Mass, Low, Forecast				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Forecast height of base of low clouds in 30 meter increments	29461
h _s h _s h _s	Height, Cloud Mass, Mid, Forecast				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Forecast height of base of mid clouds in 30 meter increments	29461
h _s h _s h _s	Vertical Visibility, forecast				X				X			Integer	Enum	N/A	See Code Table 1690	N/A	2 bytes	Vertical visibility of cloud in 30 meter increments that is forecast	29461
h _s h _s h _s	Height, Wind Shear								X			Integer	Range	m	5000 - 20000	N/A	2 bytes	Height above sea level of strongest wind	29461
h _i h _i	Clouds, height of tops of lowest							X (supp)				Integer	Range	meters	00000 - 35000	N/A	2 bytes	Height above station of tops of lowest clouds	34545
H _{w1} H _{w1}	Height, Swell Wave, Primary							X				Fixed-point	Range	meters	00.0 - 50.0	10-1	4 bytes	Height of primary swell measured from trough to crest	19600
H _{w2} H _{w2}	Height, Swell Wave, Secondary							X				Fixed-point	Range	meters	00.0 - 50.0	10-1	4 bytes	Height of secondary swell measured from trough to crest	19577
H _{wa} H _{wa}	Height, Wave			X				X				Fixed-point	Range	meters	00.00 - 50.00	10-2	4 bytes	Height of waves measured from trough to crest, instrumentally measured in 0.5 m increments	19503
H _{wa} H _{wa} H _{wa}	Height, Wave			X				X				Fixed-point	Range	meters	00.00 - 50.00	10-2	4 bytes	Height of waves measured from trough to crest, instrumentally measured in 0.1 m increments	19503

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
HH	Altitude						X					Integer	Range	km	0 - 50,000 in 5 km increments	N/A	1 byte	Altitude (at given mandatory or significant level)	19503
hhh	Geopotential							X(sf/m)				Integer	Range	gpm	Corresponding to isobaric surfaces	N/A	2 bytes	The height of a point in the atmosphere expressed in units proportional to the geopotential at that point	29754
i	Runway, tendency				X							Char	ASCII	right, left or central	'R' 'L' 'C'	N/A	1 byte	Parallel runways are distinguished via directional tendency	
I _c	Ice, Aircraft, Forecast, Type of								X			Byte	Enum	N/A	0 - 9 (Code Table 733)	N/A	1 byte	Type of forecast ice accretion on the external parts of aircraft	33584
i _d	drogue		X									Byte	Enum	N/A	BUFR code table 0-02-034	N/A	1 byte	Indicator for the type of drogue	* 18591
I _e	Echoes, Intensity of					X						Char	ASCII	N/A	0 - 9, / (Code Table 1735)	N/A	1 byte	Intensity of echo, described as weak to very strong	33595
i _o	Optical Phenomenon, Intensity of							X (supp)				Byte	Enum	N/A	0 - 2 (Code Table 1861)	N/A	1 byte	Code for intensity of optical phenomena	NE
i _o	Hoar Frost, Intensity of							X (supp)				Byte	Enum	N/A	0 - 2 (Code Table 1861)	N/A	1 byte	Code for intensity of hoar frost	NE
i _p i _p i _p	Phase of Flight	X										String	ASCII	N/A	3-letter code	N/A	8 bytes	Indicates ascent, descent, level, or unsteady flight phase, and routine or maximum wind observation during level flight	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
i _R	precipitation data provided							X				Byte	Enum	N/A	0 - 4 (Code Table 1819)	N/A	1 byte	Flag indicating whether or not data reported	33615
I _s	Accretion, Ice, Cause or Source							X				Byte	Enum	N/A	1 - 5 (Code Table 1751)	N/A	1 byte	Cause of icing	34500
i _w	Speed, Wind, Source and Units of		X					X				Byte	Enum	mps / knots	See Code Table 1855	N/A	1 byte	Code for type of wind speed units used (iw)	* 29448
i _x	Type, Station							X				Byte	Enum	N/A	See BUFR table 0-02-001	N/A	1 bytes	Buoy/platform type	* 29430
I _x I _x	Type, XBT instrument		X									Byte	Enum	N/A	See Code Table 1770	N/A	3 bytes	Three-digit code identifying the model of the XBT	* 18491
Ia....Ia	ID, Aircraft	X										String	ASCII	CCITT IA5	3 alphanumeric characters followed by 3 digits	N/A	8 bytes	Aircraft identifier	33413
II	WMO Block Number					X	X	X(sf)		X(sf)	X(xf)	Integer	Enum	N/A	(WMO 9, Section A)	N/A	2 bytes	Area of reporting station	* 29430
iii	WMO Station ID					X	X	X(sf)		X(sf)	X(xf)	Integer	Range	N/A	(WMO 9, Section D)	N/A	4 bytes	Subdivision of WMO area indicated by block number	* 29430
j ₁	Supplementary Information Indicator								X			Integer	Enum	N/A	(Code Table 2061)	N/A			NE
k ₁	digitization indicator		X									Byte	Enum	N/A	See Code Table 2262	N/A	1 byte	Denotes if this is a mandatory or a significant depth	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
k ₂	Salinity/Depth Measurement, Method		X									Byte	Enum	N/A	0 - 7 (Code Table 0 02 033)	N/A	1 byte	Code for method of measuring salinity and depth of sea at sounding location	NE
k ₃	Current Measurement, Duration and Time		X									Byte	Enum	N/A	1 - 9 (Code Table 2264)	N/A	1 byte	Code for duration and time of current measurement	*19896
k ₄	Current Measurement, Period of		X									Byte	Enum	N/A	1 - 9 (Code Table 2265)	N/A	1 byte	Code for period of current measurement	*19896
k ₅	Current Measurement, Indicator, Method Of		X									Byte	Enum	N/A	See Code Table 2262	N/A	1 byte	GEK, ship's set and drift at 3-6 hour interval fixes or 6+ hour fixes	* 18835
k ₆	Current Measurement, Velocity and Motion Removal, Method		X									Byte	Enum	N/A	0 - 9 (Code Table 2267)	N/A	1 byte	Doppler current profiling method	NE
L _a L _a L _a	Latitude	X	X									Fixed- point	Range	Degrees	-90.0000000 to 90.0000000	10-7	4 bytes	Location relative to Equator	18684
L _a L _a L _a	Latitude	X				X	X	X(sf/m)		X (SDM)	X (SM)	Fixed- point	Range	Degrees	-90.0000000 to 90.0000000	10-7	4 bytes	Location relative to Equator	18684
L _a L _a L _a	Eye, Latitude of					X						Fixed- point	Range	Degrees	- 180.000000 0 to 180.000000 0	10-7	4 bytes	Location of center of tropical cyclone relative to Equator	18684

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
L ₀ L ₀ L ₀ L ₀	Longitude	X				X	X	X(sf/m)		X (SDM)	X (SM)	Fixed-point	Range	Degrees	- 180.000000 0 to 180.000000 0	10-7	4 bytes	Location of center of tropical cyclone relative to prime meridian	18685
L ₀ L ₀ L ₀ L ₀	Eye, Longitude of		X									Fixed-point	Range	Degrees	- 180.000000 0 to 180.000000 0	10-7	4 bytes	Location of center of tropical cyclone relative to prime meridian	18685
L ₀ L ₀ L ₀ L ₀	Longitude	X										Fixed-point	Range	Degrees	- 180.000000 0 to 180.000000 0	10-7	4 bytes	Location of center of tropical cyclone relative to Equator	18685
m _r	reduction type, Data						X					Byte	Enum	N/A	See Code Table 2649	N/A	1 byte	Method of reducing data	NE
M _w	Vortex, type of							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 2555)	N/A	1 byte	Waterspout, tornado, whirlwind, dust devil	NE
MMM	Marsden Square						X	X(sf/m)		X (SDM)	X (SM)	Integer	Enum	N/A	001 - 288, 300 - 551 (Code Table 2590)	N/A	2 bytes	Area of reporting station	NE
N	Cloud Cover, Total							X(sf/m)				Byte	Range	percent	0 - 100	N/A	1 byte	Percent of sky obscured by cloud	29409
n ₀ n ₀	level number, starting at station									X	X	Integer	Range	N/A	000-255	N/A	1 byte	Data below is reported at station level	NE
n _(0:n) n _(0:n)	level number									X	X	Integer	Range	N/A	000-255	N/A	1 byte	Data below is reported at these significant levels	NE
n ₃	Cloud conditions, observed from a higher level, Evolution of							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 2863)	N/A	1 byte	Code for evolution of clouds	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
n ₃	Clouds, Evolution of							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 2863)	N/A	1 byte	Code for evolution of clouds	NE
n _b n _b n _b	ID, Buoy		X	X				X(sh)				Integer	Range	N/A	000 - 999	N/A	2 bytes	Type & serial number of buoy	NE
N _e N _e	Grid Number of 60 x 60 km radar area					X						Byte	Range	N/A	00 - 99 (Code Table 2776)	N/A	1 byte	Sequential number of 60 x 60 km square in radar coordinate grid	NE
N _h	Amount, Cloud of low or mid genus							X		X		Byte	Enum	N/A	See Code Table 2700	N/A	1 byte	Amount of genus C(L) cloud that is present, else amount of genus of C(M) cloud that is present	29449
N _m	Cloud conditions over mountain Passes							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 2745)	N/A	1 byte	Code for cloud conditions over mountains and passes	NE
N _s	Amount, Cloud, Of Genus indicated by C							X				Byte	Range	percent	0 - 100	N/A	1 byte	Amount of sky covered by low or middle clouds	29460
N _s N _s N _s	Amount, Cloud, Current Low				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Amount of sky coverage by low-level clouds at site	29449
N _s N _s N _s	Amount, Cloud, Current High				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Amount of sky coverage by high-level clouds at site	*29449
N _s N _s N _s	Amount, Cloud, Current Mid				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Amount of sky coverage by mid-level clouds at site	29449
N _s N _s N _s	Amount, Cloud, High, Forecast				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Forecast amount of sky coverage by high-level clouds at site	NE
N _s N _s N _s	Amount, Cloud, Low, Forecast				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Forecast amount of sky coverage by low-level clouds at site	36428

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
N _s N _s N _s	Amount, Cloud, Mid, Forecast				X				X			Byte	Range	percent	0 - 100	N/A	1 byte	Forecast amount of sky coverage by mid-level clouds at site	36499
N _t	Condensation Trails							X (supp)				Byte	Enum	N/A	5 - 9 (Code Table 2752)	N/A	1 byte	Code describing presence and persistence of contrails	NE
nn	accrual, glaze , Rate of							X (supp)				Integer	Range	mm/h	0 - 10000	N/A	2 bytes	Speed of glaze growth	*33588
nn	pressure, Lowest Atmospheric							X (supp)				Fixed-point	Range	hPa	830.0 - 1090.0	10-1	4 bytes	Minimum pressure	29634
nn	Hailstones, Maximum Diameter of							X (supp)				Fixed-point	Range	centimeters	00.00 - 20.00	10-2	4 bytes	Diameter of largest hailstones	29762
P ₀ P ₀ P ₀	Pressure, Station Level		X	X					X (sf/m)	X		Float	Range	hectopascals	450.00 - 1100.00	10-2	4 bytes	Pressure at station level	29635
P _(0:n) P _(0:n) P _(0:n)	Pressure, Specified Levels									X	X	Fixed-point	Range	hPa	.001 - 1100.000	10-3	4 bytes	Pressure at each level	34528
P _H P _H P _H P _H	Setting, Altimeter				X							Float	Range	hectopascals	600.0 - 1100.0	10-6	4 bytes	Altimeter setting for station	29637
P _m P _m P _m	Pressure, at Maximum Wind Level									X (wshr)	X (wshr)	Fixed-point	Range	hPa	0.0 - 500.0	10-1	4 bytes	Max wind required to be located above 500 hPa surface	34528
P _t P _t P _t	Pressure, Tropopause Level									X (tropo)		Integer	Scalar	hectopascals	0-1100	N/A	4 bytes	atmospheric pressure at the tropopause	34528
P _{w1} P _{w1}	Period, Swell Wave, Primary								X			Byte	Range	seconds	0 - 14	N/A	1 byte	Primary swell wave period	19570
P _{w2} P _{w2}	Period, Swell Wave, Secondary								X			Byte	Range	seconds	0 - 14	N/A	1 byte	Time between 2 secondary wave crests	19572
P _{wa} P _{wa}	Period, Wave, Obtained by instruments			X					X			Fixed-point	Range	seconds	00.0 - 99.9	10-1	4 bytes	Time between 2 consecutive wind wave crests	19505

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
ppp	Pressure Tendency, Amount of			X					X			Float	Range	hectopascals	0.0 - 650.0	10-1	4 bytes	Amount of pressure tendency during the three hours leading to observation	29630
PPPP	Pressure, Mean Sea-level			X					X			Fixed-point	Range	N/A	830.0 - 1090.0	10-1	4 bytes	Pressure reduced to mean sea level	29634
Q ₂	Quality Control, Housekeeping Parameter			X								byte	Enum	N/A	See Code Table 3363	N/A	1 byte	Quality of housekeeping parameter in second word of sensor data	NE
Q ₄	Quality Control, Air Temperature			X								byte	Enum	N/A	See Code Table 3363	N/A	1 byte	Quality of measurement of air temperature	29403
Q _d	Quality Control, Indicator			X								Char	ASCII	N/A	N/A	N/A	1 byte	36252 (point observation); no equivalent for grids	NE
Q _d	Quality Control, Surface Atmospheric Data			X								byte	Enum	N/A	See Code Table 3319	N/A	1 byte	Code indicating whether surface temperature measurement value is in or out of specified limits	*29612
Q _{d1}	Quality Control, Temp and Salinity Profile			X								char	Enum	N/A	See Code Table 3334	N/A	1 byte	Quality indicator of temperature-salinity profile	18556
Q _{d2}	Quality Control, Current Profile			X								char	Enum	N/A	See Code Table 3334	N/A	1 byte	Quality indicator of temperature-salinity profile	18556
Q _L	Quality Control, Of Location			X								byte	Enum	N/A	See Code Table 3311	N/A	1 byte	Reliability of location value based on satellite pass count	18556
Q _N	Quality Control, Buoy Satellite Transmission			X								byte	Enum	N/A	See Code Table 3313	N/A	1 byte	Quality of buoy satellite transmission	NE

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
Q _p	Quality Control, Pressure			X								byte	Enum	N/A	See Code Table 3315	N/A	1 byte	Code indicating whether pressure measurement value is in or out of specified limits	33244
Q _t	Quality Control, Of Time			X								byte	Enum	N/A	See Code Table 3334	N/A	1 byte	Quality indicator of observation time	NE
Q _{tw}	Quality Control, Water Surface Temp			X								byte	Enum	N/A	See Code Table 3319	array membe r	1 byte	Code indicating whether surface temperature measurement value is in or out of specified limits	18586
R ₂₄ R ₂₄ R ₂₄ R ₂₄	Precipitation, 24 Hour Total								X			Integer	Scalar	millimeters	0 - 1000	N/A	2 bytes	Water-equivalent precipitation	29590
r _a r _a	System, Radiosonde Used									X(sig)		Integer	Enum	N/A	See Code Table 3685	N/A	1 byte	Radiosonde or sounding system used	*18883
r _m	Rocket motor type						X					Byte	Enum	N/A	See Code Table 3644	N/A	1 byte	Type of rocket motor	NE
R _s	Accretion Rate, Ice							X				Byte	Enum	N/A	0 - 4 (Code Table 3551)	N/A	1 byte	Rapidity of accretion	34499
r _t	Storm Radius					X						Char	Enum	N/A	0 - 9, / (Code Table 3652)	N/A	1 byte	Distance between end of outermost spiral band and center of tropical cyclone, expressed in ranges from 0-100 km to >= 800 km	NE
R _w	RADAR Wavelength					X						Byte	Enum	N/A	1, 3, 5, 7, 9 (Code Table 3555)	N/A	1 byte	Code for wavelength of radar, expressed in ranges from 10 - 20 mm to >= 110 mm	*45012
RMK	REMARKS (Alphanumeric)	X										String	ASCII	N/A	N/A	N/A	80 bytes	Free-form	37142
RMK	Ice Report							X				String	ASCII	N/A	N/A	N/A	80 bytes	Free-form	37142

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
RR	Compound ice deposit, Diameter of							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 3570)	N/A	1 byte	Code for diameter of compound ice deposit	34501
RR	Glaze ice deposit, Diameter of							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 3570)	N/A	1 byte	Code for diameter of glaze ice deposit	34501
RR	Rime ice deposit, Diameter of							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 3570)	N/A	1 byte	Code for diameter of rime ice deposit	34501
RR	Wet snow deposit, Diameter of							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 3570)	N/A	1 byte	Code for diameter of wet snow deposit	29607
RR	Precipitation, Solid, Water Equivalent on ground							X (supp)				Integer	Range	millimeters	0 - 2000	N/A	2 bytes	Quantity of precipitation other than rain	29594
RR	Precipitation Amount							X (supp)				Integer	Range	millimeters	0 - 1000	N/A	2 bytes	At station during time period preceding observation indicated by flag below	29760
RR	Hailstones, Maximum diameter of							X (supp)				Fixed-point	Range	centimeters	00.00 - 20.00	10-2	4 bytes	Diameter of largest hailstones	29762
RRR	Period, Precipitation, For Period Preceding Observation							X				Integer	Range	millimeters	0 - 1000	N/A	2 bytes	Water-equivalent depth	33248
S	Sea State, In Alighting Area							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3700)	N/A	1 byte	Code for sea state	19564
S	Sea State, in Open Sea							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3700)	N/A	1 byte	Code for sea state in open sea	19564

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
S	Sea State, from Coastal Station							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3700)	N/A	1 byte	Code for sea state from coastal station	19564
S'	State of Water Surface in an Alighting Area							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3700)	N/A	1 byte	Code for water state in an alighting area	19564
$S_{(0:n)}S_{(0:n)}S_{(0:n)}$	Salinity at significant depths			X								Float	Range	parts per thousand	00.00 - 45.00	10-2	4 bytes	Water salinity at given depth in parts/ thousand	18575
s ₁	Type of Navigational System	X										Byte	Enum	N/A	(Code Table 3866)	N/A	1 byte	Type of navigational system used by reporting aircraft	NE
s ₂	Type of System used	X										Byte	Enum	N/A	(Code Table 3867)	N/A	1 byte	Type of (ACARS/ASDAR) system used by reporting aircraft	NE
s ₃	Temperature Precision	X										Byte	Enum	N/A	(Code Table 3868)	N/A	1 byte	Type of precision of temperature measurement	*36398
S ₆	Frozen Deposit Type							X (supp)				Byte	Enum	N/A	0 - 7 (Code Table 3764)	N/A	1 byte	Code for type of frozen deposit (glaze/rime/snow deposit/composite)	36409
S ₇	Snow Cover Character							X (supp)				Byte	Enum	N/A	0 - 8 (Code Table 3765)	N/A	1 byte	Code for snow cover character	NE
S ₈	Snow Storm Phenomena							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3766)	N/A	1 byte	Code for type of snowstorm phenomenon	NE
S' ₈	Snow Drift Evolution							X (supp)				Byte	Enum	N/A	0 - 7 (Code Table 3776)	N/A	1 byte	Code characterizing evolution of snowdrifts	NE
s _a s _a	tracking technique, status									X(sig)		Byte	Enum	N/A	(To be developed)	N/A	1 byte	Code for tracking technique/status of radiosonde system used	NE
S _c	Shape of Eye					X						Char	Enum	N/A	0 - 5, / (Code Table 3704)	N/A	1 byte	Description of shape & center of tropical cyclone	NE

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
S _i	Ice development, Stage of							X				Char	Enum	N/A	0 - 9, / (Code Table 3739)	N/A	1 byte	Stage of sea ice development	34538
S _o	Hoar Frost or colored precipitation							X (supp)				Byte	Enum	N/A	0 - 3 (Code Table 3761)	N/A	1 byte	Code for type of frost on horizontal/vertical surfaces, precipitation containing sand/dust/ash	NE
S _q	Squall, Type Of							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3848)	N/A	1 byte	Code for nature and type of squall	NE
S _r	Solar Infrared Radiation Correction									X(sig)		Integer	Enum	N/A	See Code Table 3849	N/A	1 byte	Solar and infrared correction technique used	NE
S _s	Instrument, SST							X				Byte	Enum	N/A	0 - 7 (Code Table 3850)	N/A	1 byte	Instrument measuring sea-surface temperature	NE
S _w	Temperature, Air, wet-bulb							X				Float	Range	degrees C	-600.0 - 600.0	10-1	4 bytes	Dewpoint temperature (wet-bulb)	NE
SS	Duration of Sunshine in Past Hour							X				Integer	Range	1/10 hours	0-6	N/A	2 bytes	Duration of sunshine in the past hour in tenths of an hour	NE
ss	Depth of newly fallen snow							X (supp)				Fixed-point	Range	centimeters	000.0 - 500.0	10-1	4 bytes	Snow accumulation	29607
sss	Depth, Snow							X				Fixed-point	Range	centimeters	0000.0 - 1200.0	10-1	4 bytes	Accumulated snow at station	29596
T _(0:n) T _(0:n)	Temperature, Air, At Specified Level									X		Float	Range	degrees Celsius	-60.0 - 60.0	10-1	4 bytes	Air temperature at given level	33661
T _(0:n) T _(0:n)	Temperature, Air, At standard Level									X		Float	Range	degrees Celsius	-60.0 - 60.0	10-1	4 bytes	Air temperature at given level	33661
T _(0:n) T _(0:n) T _(0:n)	Temperature, Sea, At Depth starting at surface			X								Float	Range	degrees Celsius	-110.0 - 63.0	10-1	4 bytes	Water temperature at given depth	18579

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
T _(1:n) T _(1:n)	Temperature, Air, At Specified Level						X					Float	Range	degrees Celsius	-60.0 - 60.0	10-1	2 bytes	Temperature at given isobaric surface	33661
T _A T _A T _A	Temperature, Air	X										Fixed-point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Temperature measured by aircraft	29402
T _b T _b T _b	Temperature, Air, Wet-bulb							X				Fixed-point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Temperature to which an air parcel must be cooled at constant pressure and water vapor to reach saturation	NE
T' _d T' _d	Temperature, dew-point				X							Float	Range	degrees C	-60.0 - 60.0	10-1	4 bytes	Dewpoint temperature (wet-bulb)	29411
T _d T _d T _d	Temperature, Dew Point	X		X				X				Fixed-point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Temperature to which an air parcel must be cooled at constant pressure and water vapor to reach saturation	29411
t _e	Time interval of eye movement					X						Char	ASCII	N/A	3 - 9, / (Code Table 4035)	N/A	1 byte	Period over which movement of center of tropical cyclone has been calculated, ranging from 15 min to > 6 h	NE
T _f T _f	Temperature, Forecast								X			Fixed-point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Predicted temperature at station	36397
t _L	Thickness, Ice layer, Forecast								X			Byte	Enum	N/A	0 - 9	N/A	1 byte	Thickness of ice layer forecast	34518
T _n T _n T _n	Temp, Min, For Period							X				Fixed-point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Lowest temperature during report period	29759
t _R	Period, Duration of Precipitation,							X				Byte	Enum	N/A	0 - 9 (Code Table 4019)	N/A	1 byte	< 1 - 24 h	29617

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
t _R	Precipitation, Time Period ended							X				Byte	Enum	N/A	1 - 9 (Code Table 3552)	N/A	1 byte	Ending time of precipitation reported	29617
T _i T _i	Temperature, Air, Tropopause Level									X (tropo)		Float	Range	degrees Celsius	-60.0 - 60.0	10-1	4 bytes	Air temperature at tropopause	33661
T _v T _v	Air Temperature Variation, Sudden rise							X (supp)				Fixed- point	Range	degrees C	0.0 - 60.0	10-1	4 bytes	Amount of rapid increase in temperature	*29402
T _v T _v	Air Temperature Variation, Sudden fall							X (supp)				Fixed- point	Range	degrees C	0.0 - 60.0	10-1	4 bytes	Amount of rapid decrease in temperature	*29402
t _w	Time of commencement of condensation							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 4055)	N/A	1 byte	Code for time before observation time that condensation commenced	NE
T _w	Variation in Temperature Associated with Frozen Deposit							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 3955)	N/A	1 byte	Code for temperature variation in area of frozen deposit during past-weather report period	NE
T _w T _w	Temperature, Water at resorts during bathing season							X (supp)				Fixed- point	Range	degrees C	-5.0 -45.0	10-1	4 bytes	Sea temperature	18579
T _w T _w T _w	Temperature, Sea Surface			X				X	X	X		Float	Range	degrees Celsius	-2.0 - 40.0	10-1	4 bytes	Sea-surface water temperature	18579
T _x T _x T _x	Temp, Max For Period		Syn					X				Fixed- point	Range	degrees C	-110.0 - 63.0	10-1	4 bytes	Highest temperature during report period	29640
tt	Conditions, Present or Past, ended							X (supp)				Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Referenced to Jan. 1, 1970	44242

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
tt	Conditions, Present or Past, persistent or non persistent, Duration of							X (supp)				Byte	Enum	N/A	00 - 75 (Code Table 4077)	N/A	1 byte	Duration of past weather conditions reported	33185
tt	Conditions, Present or Past, Time Commenced							X (supp)				Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Referenced to Jan. 1, 1970	44240
tt	Phenomenon, Supplementary, Duration , up to observation time, of period							X (supp)				Byte	Enum	N/A	00 - 75 (Code Table 4077)	N/A	1 byte	Duration up to report time of phenomenon that is continuing as of report time	33185
tt	Phenomenon, Supplementary, Duration of Persistent or non							X (supp)				Byte	Enum	N/A	00 - 75(Code Table 4077)	N/A	1 byte	Duration of phenomenon reported	33185
tt	Phenomenon, Supplementary, occurrence, Time							X (supp)				Byte	Enum	N/A	00 - 75 (Code Table 4077)	N/A	1 byte	Duration up to report time of phenomenon that is continuing as of report time	NE
tt	Phenomenon, Supplementary, Time Commenced							X (supp)				Long	Range	Seconds since 1970	0 - 232	N/A	4 bytes	Referenced to Jan. 1, 1970	44240
TTT	Temperature, Air				X							Float	Range	degrees C	-600.0 - 600.0	10-1	4 bytes	Air temperature (dry- bulb)	29402
TTT	Temp, Air, Surface		X	X					X			Fixed- point	Range	degrees C	-5.0 - 45.0	10-1	4 bytes	Temperature of water at surface	29402
TTTTT	Forecast Change Indicator				X							Byte	Enum	N/A	See BUFR table 0- 08-016	N/A	1 byte	Trend of weather denoted by 'BECMG', 'TEMPO', 'NOSIG', 'FM', 'reserved,' or 'missing'	NE

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
TTTTT	Temporary Changes Indicator								X			Byte	Enum	N/A	See BUFR table 0-08-016	N/A	1 byte	Trend of weather denoted by 'BECMG', TEMPO', 'NOSIG', 'FM', 'reserved,' or 'missing'	NE
TTTTT	Trend Indicator								X			Byte	Enum	N/A	See BUFR table 0-08-016	N/A	1 byte	Trend of weather denoted by 'BECMG', TEMPO', 'NOSIG', 'FM', 'reserved,' or 'missing'	NE
U _v U _v	Humidity, Relative, Sudden drop in							X (supp)				Integer	Range	percent	0 - 100	N/A	2 bytes	Amount of rapid decrease in relative humidity	*29414
U _v U _v	Humidity, Relative, Sudden Rise in							X (supp)				Integer	Range	percent	0 - 100	N/A	2 bytes	Amount of rapid increase in relative humidity	*29414
UUU	Relative Humidity	X		X				X				Byte	Range	percent	0 - 100	N/A	1 byte	Calculated ratio of vapor pressure to saturation vapor pressure	29414
V _a V _a	Difference between maximum wind and wind blowing 1 km above									X (wshr)	X (wshr)	Fixed-point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Difference between maximum wind and wind blowing 1 km below	*45520
V _b	visibility, Variation in over past hour							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 4332)	N/A	1 byte	Code characterizing variation in visibility over the past hour	29423
V _B V _B	drift speed			X								integer	Range	centimeters / second	0 - 9999	N/A	2 bytes	buoy drift speed	NE
V _b V _b	Difference between maximum wind and wind blowing 1 km below									X (wshr)	X (wshr)	Fixed-point	Range	m/s	000.0 - 200.0	10-1	4 bytes	Difference between maximum wind and wind blowing 1 km above	*45520

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
V _c V _c	Speed, Current, At Depth		X									Float	Range	cm / second	-10 - 10	N/A	4 bytes	Speed of current at selected depth	18581
V _I V _I V _I V _I	Buoy, Engineering Status of			X								char	String	N/A	N/A	N/A	32 bytes	Information on engineering status of buoy	NE
v _p	Forward Speed of phenomenon reported in Additional Present weather							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 4448)	N/A	1 byte	Code describing motion of phenomenon observed at station	32960
v _p	Forward Speed of phenomenon reported in past weather 2							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed	32960
v _p	Forward Speed of phenomenon reported in present conditions							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed	32960
v _p	Phenomenon, Forward Speed of							X (supp)				Char	Enum	N/A	0 - 9, / (Code Table 0700)	N/A	1 byte	Code for direction in which phenomenon is observed	32960
V _R V _R V _R V _R	Runway, maximum visual variation				X							Integer	Range	meters	increments of 50m to 500m, 100m from 500m- 3000m, 500m from 3000m- 5000m, 1000m thereafter	N/A	2 bytes	Included if visual range varies significantly	45146
V _s	Speed, Ship							X (ship)				Char	Enum	N/A	0 - 9, / (Code Table 4451)	N/A	1 byte	Ship speed	29422

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Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
V _s	Visibility, over water, from coastal station							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility from a coastal station	29422
V' _s	Visibility over water in alighting area							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Visibility range in a seaplane alighting area	29422
V _s V _s	Visibility towards Sea							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward sea	29422
V _x V _x V _x V _x	Visibility, Maximum Horizontal				X							Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward sea	29422
VV	Visibility, Surface Horizontal							X				Integer	Range	meters	increments of 50m to 500m, 100m from 500m-3000m, 500m from 3000m-5000m, 1000m thereafter	N/A	2 bytes	Visibility at surface	29422
VV	Visibility E							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward E	29422
VV	Visibility N							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward N	29422
VV	Visibility NE							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward NE	29422
VV	Visibility NW							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward NW	29422
VV	Visibility S							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward S	29422

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
VV	Visibility SE							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward SE	29422
VV	Visibility SW							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward SW	29422
VV	Visibility W							X (supp)				Integer	Range	meters	000000 - 160000	N/A	3 bytes	Horizontal distance of visibility, toward W	29422
VVVV	Visibility, Horizontal				X				X			Integer	Range	m	000000 - 160000	N/A	3 bytes	Maximum predicted horizontal visibility at location	29422
w ₁ w ₁	Phenomenon, Present Weather or Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Further description of phenomenon	NE
w ₁ w ₁	Phenomenon, For Given Period, Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Further description of phenomenon	NE
w ₁ w ₁	Phenomenon, Preceding Hour, Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Amplification for present weather codes 20 - 29 reported in main part of message	NE
W ₁ W ₂	Conditions, Past							X				Byte	Enum	N/A	0 - 9 (Code Table 4561)	N/A	1 byte	Code for most significant past weather	NE
W _c	Eye of Tropical Storm, Diameter of					X						Char	Enum	N/A	0 - 9, / (Code Table 4504)	N/A	1 byte	Longest diameter of eye of tropical cyclone, expressed in ranges from < 5 km to >= 50 km	NE
W _r	Phenomenon, Type of					X						Char	ASCII	N/A	1 - 9, / (Code Table 4530)	N/A	1 byte	Weather phenomenon or cloud observed in location noted above	NE
ww	Conditions, Current							X				Byte	Enum	N/A	00 - 99 (Code Table 4677 or 4680)	N/A	1 byte	Code for present weather at the station	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD-OB	ROC-OB	SYN	TAF	UAT	UAW	Type	Format	Units	Range	Precision	Size	Description	DDM Counter
w'w'	Conditions, Forecast				X				X			String	ASCII	N/A	(Code Table 4678)	N/A	80 bytes	Description of significant forecast weather at site	NE
w'w'	Conditions, Significant Present				X				X			String	ASCII	N/A	(Code Table 4678)	N/A	80 bytes	Description of significant present weather at site	NE
w'w'	Conditions, Temporary Changes								X			String	ASCII	N/A	BECMG, TEMPO, FM (prefixing conditions in report that are expected to change during forecast period)	N/A	40 bytes	BECMG indicates change to one or more predicted conditions at some time during forecast period. TEMPO indicates temporary fluctuations in predicted conditions that each last less than 1 hour and together last less than half of forecast period. Predicted	NE
ww	Phenomenon or Present Weather, Additional							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 4677)	N/A	1 byte	Condition observed simultaneously with and/or in addition to that stated earlier in report	NE
ww	Phenomenon or Present Weather, Additional							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 4677)	N/A	1 byte	Condition observed simultaneously with and/or in addition to that stated earlier in report	NE
ww	Phenomenon or Weather, Present Weather, Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Further description of phenomenon	NE
ww	Phenomenon or Weather, Present Weather, Amplification, Additional							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Condition observed simultaneously with and/or in addition to that stated earlier in report	NE

PRELIMINARY

Table 3.2.3-3. METOC Observation Data Elements

WMO Symbolic Code	Parameter Name	AIREP	Bathy	Buoy	M/S	RAD- OB	ROC- OB	SYN	TAF	UAT	UAW	Type	For- mat	Units	Range	Preci- sion	Size	Description	DDM Counter
w'w'	Phenomenon, Present Weather or Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Further description of phenomenon	NE
w'w'	Phenomenon, For Given Period, Amplification							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 4677)	N/A	1 byte	Weather at time other than standard reporting time	NE
w'w'	Phenomenon, Preceding Hour, Amplification							X (supp)				Byte	Enum	N/A	(Code Table 4687)	N/A	1 byte	Amplification for present weather codes 20 - 29 reported in main part of message	NE
w'w'	Phenomenon, at Time of Supplementary Reported Weather							X (supp)				Byte	Enum	N/A	00 - 99 (Code Table 4677)	N/A	1 byte	Weather at time other than standard reporting time	NE
X _r X _r	recorder type		X									Byte	Enum	N/A	See Code Table 4770	N/A	2 bytes	two-digit code identifying recording instrument used	18587
Z _(0:n) Z _(0:n)	depth, starting from surface			X								Integer	Range	meters	-100 - 12000	N/A	4 bytes	depth from sea surface	NE
Z _d Z _d Z _d	cable length			X								integer	Range	meters	0 - TBD	N/A	2 bytes	length of cable attached to drogue	NE
z _i	Trends, Situation, Ice							X				Char	Enum	N/A	0 - 9, / (Code Table 5239)	N/A	1 byte	Current ice situation and conditions in preceding 3 h	NE
Z _o	Optical Phenomena							X (supp)				Byte	Enum	N/A	0 - 9 (Code Table 5161)	N/A	1 byte	Code for type of optical phenomena	NE
zz	Variability, location, Intensity of Present or past Conditions							X (supp)				Byte	Enum	N/A	70 - 99 (Code Table 4077)	N/A	1 byte	Word description of present/past conditions	NE

PRELIMINARY